Proposed Re-evaluation Decision PRVD2023-02

Azoxystrobin and Its Associated End-use Products

Consultation Document

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Proposed re-evaluation decision for azoxystrobin and associated end-use products

Under the authority of the *Pest Control Products Act,* all registered pesticides must be re-evaluated by Health Canada's Pest Management Regulatory Agency (PMRA) to ensure that they continue to meet current health and environmental standards and continue to have value. The re-evaluation considers data and information from pesticide manufacturers, published scientific reports and other regulatory agencies. Health Canada applies internationally accepted risk assessment methods as well as current risk management approaches and policies.

Azoxystrobin is a fungicide registered for the control of various fungal diseases on a wide range of agricultural crops including, fruits, vegetables, specialty crops, greenhouse and outdoor ornamentals, turf and seed treatment. Currently registered products containing azoxystrobin can be found in the Pesticide Product Information Database and in Appendix I. Appendix II lists all uses for which azoxystrobin is presently registered.

This document presents the proposed re-evaluation decision for azoxystrobin, including the proposed amendments (risk mitigation measures) to protect human health and the environment, as well as the science evaluation on which the proposed decision is based. All products containing azoxystrobin that are registered in Canada are subject to this proposed re-evaluation decision. This document is subject to a 90-day public consultation period,[1] during which the public (including the pesticide manufacturers and stakeholders) may submit written comments and additional information to PMRA Publications. The final re-evaluation decision will be published after taking into consideration the comments and information received during the consultation period.

Proposed re-evaluation decision for azoxystrobin

Under the authority of the *Pest Control Products Act* and based on an evaluation of available scientific information, Health Canada is proposing continued registration of azoxystrobin and associated end-use products registered for sale and use in Canada.

With respect to human health, potential risks from dietary (food and drinking water), occupational, non-occupational and postapplication risks were shown to be acceptable when azoxystrobin is used according to proposed conditions of registration, which includes risk mitigation measures related to human health as identified below.

Potential risks to the environment were shown to be acceptable when azoxystrobin is used according to the proposed conditions of registration, which includes new mitigation measures, as identified below.

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

Azoxystrobin is one of the few systemic fungicides registered for control of various fungal diseases on a wide range of agricultural crops including ornamentals, vegetables and fruit crops, cereals and turf. Due to its curative and eradicative properties, post-infection application reduces disease development.

Risk mitigation measures

Registered pesticide product labels include specific directions for use. Directions include risk mitigation measures to protect human health and the environment and must be followed by law. The proposed label amendments including any revised/updated label statements and/or mitigation measures, as a result of the re-evaluation of azoxystrobin, are summarized below. Refer to Appendix IX for details.

Human health

As a result of the re-evaluation of azoxystrobin, Health Canada is proposing further risk-reduction measures in addition to those already present on the product labels. Additional revisions to the azoxystrobin labels are also proposed to meet the current labelling standards.

To protect human health and improve label statements to meet current standards, the following risk reduction measures are proposed:

- Rotational plant-back intervals (PBIs) of 30 days for broadleaf or root crops and 45 days for cereal crops that are not registered uses of azoxystrobin are proposed, unless the current label directions are more restrictive.
- Updated standard restricted-entry intervals (REI) and re-entry statements.
- Updated re-treatment intervals of 21–28 days for barley, rye and wheat.
- A prohibition of the use of handheld mist blower/airblast or handheld fogging equipment in greenhouse.
- A prohibition of the use of the commercial products on residential turf sites.
- Updated standard drift statement.
- Increased or updated personal protective equipment (PPE), updated precautionary statements and engineering controls for seed treatment uses (requirement for a closed transfer system)
- A standard statement to seed treatment labels and seed tags to keep products out of reach of children and animals.

Environment

To protect the environment, the following risk-reduction measures are proposed:

- Updated environmental precautionary statements.
- New or updated spray buffer zones ranging from 0–20 meters for all uses.

International context

Azoxystrobin is currently acceptable for use in other Organisation for Economic Co-operation and Development (OECD) member countries, including the United States, Australia, and the European Union.

No decision by an OECD member country to prohibit all uses of azoxystrobin for health or environmental reasons has been identified as of December 2022.

Next steps

Upon publication of this proposed re-evaluation decision, the public, including the registrants and stakeholders are encouraged to submit comments during the 90-day public consultation period.

All comments received during the 90-day public consultation period will be taken into consideration in preparation of re-evaluation decision document,[2] which could result in revised risk mitigation measures. The re-evaluation decision document will include the final re-evaluation decision, the reasons for it and a summary of comments received on the proposed re-evaluation decision with Health Canada's responses.

Refer to Appendix I for details on specific products impacted by this proposed decision.

Other information

The relevant confidential test data on which the proposed decision is based are available for public inspection, upon application, in PMRA's Reading Room. For more information, please contact the Pest Management Information Service.

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

Additional scientific information

The PMRA has identified the following information which is required to further inform the assessment of azoxystrobin. The PMRA will issue a data call-in for this information.

DACO	Description/Reference
Toxicology	
4.8	Any available studies that elaborate on the toxicity profile of azoxystrobin, including additional endocrine disruption and reproductive toxicity studies. Data should be submitted **during consultation, if not already submitted.**

Science evaluation

1.0 Introduction

Azoxystrobin is a fungicide registered for the control of various fungal diseases on a wide range of agricultural crops, fruits, vegetables, specialty crops, greenhouse and outdoor ornamentals, turf, and seed. It can be applied by ground and aerial application equipment and as a seed treatment by growers and licensed applicators. There are ten sources of azoxystrobin technical grade active ingredient, one manufacturing concentrate and thirty-three commercial end-use products containing azoxystrobin currently registered in Canada.

2.0 Technical grade active ingredient

2.1 Identity

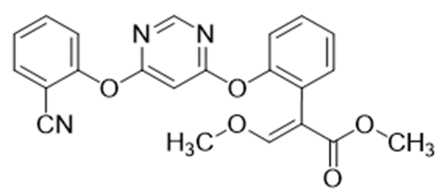
Common name		Azoxystrobin
Function		Fungicide
Chemical Family		Methoxyacrylate
Chemical name		
1	**International Union of Pure and Applied Chemistry (IUPAC)**	methyl (2E)-2-(2-{[6-(2-cyanophenoxy)pyrimidin-4-yl]oxy}phenyl)-3-methoxyprop-2-enoate OR
2	**Chemical Abstracts Service (CAS)**	Methyl (α*E*)-2-[[6-(2-cyanophenoxy)-4-pyrimidinyl]oxy]-α-(methoxymethylene)benzeneacetate
CAS Registry Number		131860-33-8
Molecular Formula		$C_{22}H_{17}N_3O_5$
Structural Formula		
Molecular Weight		403.3

Table 1 Certification of Limits for Azoxystrobin

Registration number	NC (w %)	LCL (w %)	UCL (w %)
26152	96	93.1	100
31420	98.9	96	99.5
31722	99	96	100
31723	98.40	95.45	99.9
32045	97.5	94.58	99.9
32429	98.6	95.6	100
33068	98.8	95.8	100
33079	98.8	95.85	100

2.2 Physical and chemical properties

Property	Result
Vapour pressure at 20°C	1.1×10^{-7} mPa
Ultraviolet (UV) / visible spectrum	Not expected to absorb at λ >300 nm
Solubility in water at 20–25°C	6.7 mg/L (pH 7)
n-Octanol/water partition coefficient at 20°C	Log K_{ow} = 2.5
Dissociation constant	Not expected to dissociate

3.0 Human health assessment

3.1 Toxicology summary

Azoxystrobin is a broad-spectrum fungicide that belongs to a β-methoxyacrylates (structural class) group of strobilurins, with a mode of action involving the inhibition of electron transport in mitochondria of the target fungi. A detailed review of the toxicological database for azoxystrobin was conducted. The database is complete, consisting of the full array of toxicity studies currently required for hazard assessment purposes. Several new studies were submitted, including additional acute in vivo and in vitro toxicity studies, genotoxicity studies, preliminary toxicokinetic studies, a preliminary neurotoxicity study, a QSAR (quantitative structure activity relationship) assessment of toxicological properties and two toxicity studies on a major rat metabolite of azoxystrobin.

The majority of studies were carried out in accordance with currently accepted international testing protocols and Good Laboratory Practice (GLP). The human health risk assessment also considered information in the published scientific literature. The scientific quality of the data is acceptable and the database is considered adequate to characterize the potential health hazards associated with azoxystrobin.

Azoxystrobin was tested in several toxicokinetic studies. Independent of dosing regimen, azoxystrobin underwent rapid and extensive systemic absorption following oral gavage exposure. Substantial absorption from the gastrointestinal tract was demonstrated in bile duct-cannulated rats, where, within the first 48 hours, the majority of the administered dose (AD) was excreted in the bile, to a lesser extent in the feces, and minimally in the urine. Absorbed azoxystrobin was widely distributed to all tissues after a single low- or high-dose, with the highest levels detected in the kidneys and liver, followed by intestinal contents. Tissue retention was minimal after seven days. There were no apparent sex-related differences in distribution of administered radioactivity. Excretion via expired air was negligible. Sex-related differences in excretion were minor, although female rats showed slightly higher absorption and metabolism of azoxystrobin.

Absorbed azoxystrobin, radiolabelled in the pyrimidinyl, phenylacrylate, or cyanophenyl moieties, was extensively metabolized in the rat via hydrolysis and subsequent conjugation with minor differences observed between sexes, regardless of the radiolabel position. Fifteen metabolites were identified with six additional uncharacterized metabolites, as summarized in Appendix III, Table I. The majority of biliary radioactivity was identified as a glucuronide conjugate of the methoxyacid (metabolite V), representing almost a third of the AD in males and females. Hydroxylation and conjugations of the cyanophenyl moiety (glucuronide, glutathione, cysteine, cysteinyl-glycine or mercapturate) represented the second major group of biliary metabolites. Minimal demethoxylation of the phenylacrylate acid moiety and cleavage of the ether linkages were apparent. Essentially no azoxystrobin was detected in the bile, feces or urine 48 hours after a single low dose; however, 48 hours following a single high dose, the majority of faecal radioactivity was unchanged azoxystrobin, which accounted for about a third of the AD.

Comparison of the plasma metabolite profiles for rat and rabbit by thin layer chromatography demonstrated that, although there were quantitative differences, they were qualitatively similar. Acid-metabolite V was the major metabolite in both species; however concentrations in plasma were considerably higher (10 to 100-fold) in rat than in the rabbit. In addition, a higher (approximately 10-fold) concentration of metabolite V was noted in the plasma of pregnant compared to non-pregnant rabbits at a similar dose level. Although limited information on toxicokinetics in the dog was available, it was noted that the relationship between dose and plasma concertation was non-linear with repeated dose treatment, and the major rat metabolite was not detected in dog plasma.

Azoxystrobin was of low acute toxicity via the oral and dermal routes in rats. Azoxystrobin was of slight acute toxicity in rats following inhalation exposure, with clinical signs of toxicity including slow or laboured respiration, breathing irregularities, hunched posture, piloerection, reduced activity, splayed gait, reduced splay reflex and instability. All rats that died during inhalation exposure had dark red or mottled lungs. Azoxystrobin was minimally irritating to rabbit eyes as well as rabbit skin. Azoxystrobin was non-irritating to in vitro bovine eyes and in vitro skin (EPSKIN), with no GHS category assigned. Evidence of dermal sensitization was not observed in guinea pigs using the maximization test method, despite TOXTREE and DEREK predictions indicating sensitization potential based on quantitative structure activity relationships.

In short-term oral toxicity studies in mice, rats and dogs treated with azoxystrobin, decreased body weight and effects on the liver were observed in all species. Adverse effects included changes in clinical chemistry associated with liver injury in rats and dogs. These parameters were not measured in mice. Liver histopathology in mice (increased eosinophilic staining of periportal hepatocytes and/or microvesicle formation) occurred at the same dose level as liver weight increases. In the rat, histopathology (slight to moderate proliferation of the intrahepatic bile ducts and oval cells; extrahepatic bile duct cholangitis, hepatocellular hyperplasia) occurred at higher dose levels than liver weight changes. Pathologic changes in the liver were not noted in dogs. Additional effects in rats included distended abdomen, increased brain and kidney weights, and, at the highest dose level, hematological effects, inflammatory cell infiltrate in the pancreas, and other clinical chemistry findings. Additional effects in dogs noted at the highest dose level tested included clinical signs of toxicity (salivation, fluid feces, vomiting) and increased thyroid weights.

No treatment-related effects occurred at the limit dose of testing in a rat repeat-dose dermal toxicity study. A repeat-dose inhalation toxicity study with a formulated product which is not registered in Canada was available; however, the study was not considered relevant for risk assessment of the technical grade active ingredient.

Chronic dietary exposure in mice and rats resulted in decreased body weight and increased liver weight in both sexes, and, uniquely to mice, eye discharge, distended duodenum, and decreased spermatozoa in the epididymis in males and distended jejunum and increased incidence of mononuclear cell infiltration of the thyroid gland in females. Similar to the effects noted in short-term dietary toxicity studies, chronic dietary exposure in rats resulted in altered clinical chemistry parameters indicative of an effect on the liver (increased cholesterol, liver enzymes and albumin, and decreased triglyceride levels). Liver histopathology (distention of the common bile duct, marked biliary hyperplasia) accompanied the clinical chemistry changes. At the highest dose level in males, survival was also decreased.

In rat and mouse long-term dietary toxicity studies, there was no evidence of tumourigenicity. A standard battery of in vitro genotoxicity assays, including bacterial reverse gene mutation assays, a chromosome aberration assay, mammalian gene mutation assays, as well as in vivo micronucleus and unscheduled DNA synthesis assays, were available. Azoxystrobin was negative for inducing reverse mutations in vitro with or without metabolic activation. However, azoxystrobin was positive for forward mutations in a mammalian in vitro cell assay in mouse lymphoma cells and caused an increase in the percentage of aberrant cells in the mammalian cell cytogenetics assay in human lymphocytes, with or without metabolic activation. The mutagenic and clastogenic effects observed in mammalian cells in vitro were not expressed in vivo. In vivo results obtained in mouse bone marrow micronucleus assays, were negative for clastogenic activity, and azoxystrobin did not induce DNA damage and repair in the liver of rats in an in vivo unscheduled DNA synthesis assay.

Furthermore, azoxystrobin did not trigger any alerts in DEREK for carcinogenicity, chromosome damage, genotoxicity or mutagenicity (QSAR, 2013). Overall, the available data suggest that azoxystrobin is not mutagenic or clastogenic in vivo and is not tumourigenic.

Reproductive toxicity was not observed in the dietary 2-generation reproductive toxicity study in rats. Systemic toxicity in the parental animals consisted of reduced body weight and food consumption, as well as increased liver weight and pathological effects in the liver and bile duct in the males. In animals with bile duct pathology, effects included distention of the common bile duct, characterized as epithelial hyperplasia of the intra-duodenal portion, cholangitis, ulceration of the dilated region, and small basophilic deposits in the lumen, as well as proliferative cholangitis. These effects are similar to those identified in the short- and long-term dietary rat studies. Sexual maturation, ovarian follicle counts, estrous cycle length and periodicity, and sperm parameters (motility and morphology) were not examined, although these parameters were not required at the time of study conduct. The concern for these missing parameters was considered low, given the lack of effects on the endocrine system across the available toxicity database.

In the offspring, decreased body weight was noted in F2a pups, at the mid-dose level, starting on post-natal day (PND) 22, in the absence of maternal toxicity. At the highest dose level, both F1a and F2a pups showed decreased body weights and increased liver weights before weaning, in the presence of maternal toxicity. The offspring body weight effects were considered treatment-related, however the magnitude of the effect at the mid-dose level was marginal, and the effect occurred only at the post-weaning stage. The animals were housed with dams until PND 29 and although food consumption data was not available for PND 21-29 in the young rats, it is assumed that the young animals were receiving higher doses of azoxystrobin during the last week of the lactation phase due to consumption of both milk and feed. For PND 21-29, the pups typically consume more food on the body weight basis than the dam, and thus are likely receiving a higher dose of azoxystrobin than the dam. As a result, the amount of azoxystrobin being consumed by the pups on a per kg/bw basis is under-estimated when using the maternal dose level as a proxy for the pups. Based on the underestimated dosage for the pups, as well as the conservative approach undertaken for the noted marginal decrease in body weights at the mid-dose level, there is a low level of concern for sensitivity of the young.

In standard gavage developmental toxicity studies in rats and rabbits, developmental toxicity was not observed. In rats, maternal toxicity occurred after one day of dosing, as evidenced by an increased incidence of diarrhea and urinary incontinence. With repeated dosing, reduced body weight or body-weight loss, decreased food consumption and mortality were noted in the dams. Similar maternal toxicity was observed in the rabbits in the gavage developmental toxicity studies.

Data from supplemental developmental toxicity studies in rabbits indicated that large volumes of gavage corn oil were not well-tolerated by rabbits, resulting in increased incidences of diarrhea, suppression of body weight gain, and decreased survival of dams. However, in the standard study, diarrhea is considered a treatment-related effect since it occurred in a dose-related manner with a constant volume of corn oil for gavage dosing.

Furthermore, this endpoint was observed at higher dose levels in the 12-month capsule dog toxicity study and transiently in the acute gavage neurotoxicity study in rats. Overall, there was no evidence of treatment-related malformations or sensitivity of the young observed in either the rat or rabbit developmental toxicity study.

The neurotoxic potential of azoxystrobin was examined in rats following acute or intermediate-term exposures. After acute gavage exposure, clinical signs including transient diarrhea (starting at the lowest dose) and tip-toe gait were observed two-hours post-dosing in both sexes but did not persist after day one. Decreased body weight and hindlimb grip strength were noted in males, and decreased overall motor activity was observed in females, at dose levels that exceeded the limit dose. The effects following dietary exposure in a 90-day neurotoxicity study included decreases in body weight gain, body weight, food utilization and food consumption. There was no evidence of selective neurotoxicity in the database.

The major rat metabolite, metabolite V, was of low oral acute toxicity and was negative in the Ames assay, with and without metabolic activation. A QSAR assessment (2013) did not include any examination of azoxystrobin metabolites. Based on the available information, metabolite V is considered to be of equivalent toxicity to azoxystrobin.

The identification of select metabolites is presented in Appendix III, Table 1. Results of the toxicology studies conducted on laboratory animals with azoxystrobin and select metabolites are summarized in Appendix III, Table 2. The toxicology reference values for use in the human health risk assessment are summarized in Appendix III, Table 3.

3.1.2 *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.

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 gavage developmental toxicity studies in rats and rabbits and a dietary 2-generation reproductive toxicity study in rats. In addition, supplemental dose range-finding developmental toxicity studies in rabbits were assessed, including studies with non-gravid rabbits to examine the effects of vehicle volumes.

With respect to potential pre- and post-natal toxicity, there was a marginal decrease in F2a post-weaning rats body weights in the absence of maternal toxicity in the rat 2-generation reproductive toxicity study. However, this effect was not considered serious, there was a marginal magnitude of change, and it occurred only post-weaning in one generation. Furthermore, it is likely that the pups were exposed to higher doses of azoxystrobin due to the consumption of both milk and feed in the last week pre-weaning, and food consumption at that age post-weaning is generally increased. Other offspring effects observed at a higher dose level included increased liver weight and decreased body weights in pre-weaning animals of both generations, in the presence of maternal toxicity. In the developmental toxicity studies in rat and rabbit there was no evidence of treatment-related malformations and no indication of increased sensitivity of the young compared to adult animals.

Overall, the database is adequate for determining the sensitivity of the young, as the effects are well characterized. On the basis of the available information, the *Pest Control Products Act* factor (PCPA factor) was reduced to onefold.

3.2 Dietary exposure and risk assessment

In a dietary exposure assessment, Health Canada determines how much of a pesticide residue, including residues in meat and milk, may be ingested with the daily diet. Exposure to azoxystrobin from potentially treated imported foods is also included in the assessment. Dietary exposure assessments are age-specific and incorporate the different eating habits of the population at various stages of life (infants, children, adolescents, adults and seniors). For example, the assessments take into account differences in children's eating patterns, such as food preferences and the greater consumption of food relative to their body weight when compared to adults. Dietary risk is then determined by the combination of the exposure and the toxicity assessments. High toxicity may not indicate high risk if the exposure is low. Similarly, there may be risk from a pesticide with low toxicity if the exposure is high.

Health Canada considers limiting use of a pesticide when exposure exceeds 100% of the reference dose. Health Canada's Science Policy Note SPN2003-03, *Assessing Exposure from Pesticides, A User's Guide*, presents detailed risk assessment procedures.

Residue estimates used in the dietary exposure assessment (DEA) may be based conservatively (in other words, are high-end estimates) on the maximum residue limits (MRLs) or the field trial data representing the residues that may remain on food after treatment at the maximum label rate. Surveillance data representative of the national food supply may also be used to derive a more accurate estimate of residues that may remain on food when it is purchased. These include the Canadian Food Inspection Agency's (CFIA) National Chemical Residue Monitoring Program and the United States Department of Agriculture Pesticide Data Program (USDA PDP). Specific and empirical processing factors as well as specific information regarding percent of crops treated may also be incorporated to the greatest extent possible.

Sufficient information was available to adequately assess the dietary exposure and risk for azoxystrobin. Acute and chronic dietary exposure and risk assessments were conducted using the Dietary Exposure Evaluation Model - Food Commodity Intake Database™ (DEEM-FCID™, Version 4.02, 05-10-c) program which incorporates consumption data from the National Health and Nutrition Examination Survey/What We Eat in America (NHANES/WWEIA) for the years 2005-2010 available through the Centers for Disease Control and Prevention's (CDC) National Center for Health Statistics (NCHS). Further details on the consumption data are available in Health Canada's Science Policy Note SPN2014-01, *General Exposure Factor Inputs for Dietary, Occupational and Residential Exposure Assessments*.

Canadian MRLs for azoxystrobin and the current residue definition for enforcement are available in the Pesticides section of the Canada.ca website. The residue definition in plant and animal commodities was previously determined to be azoxystrobin and its *Z*-isomer for enforcement and risk assessment purposes. However, as a result of the re-evaluation, the *Z*-isomer is found to be a minor metabolite in plant commodities and is not found at measurable levels in animal metabolism studies. Therefore, Health Canada is proposing to remove the *Z*-isomer from the residue definition. This proposed change is aligned with Codex and the European Food Safety Authority. Since *Z*-isomer residues do not contribute significantly to the total residues, no numeric amendments to the currently established maximum residue limits (MRLs) are being proposed as part of the re-evaluation decision and the current Canadian MRLs for azoxystrobin will be maintained. A goat metabolism study that was submitted through the Incident Reporting Program in December 2021 was considered in assessing the residue definition for azoxystrobin in animal commodities.

The residue definition in drinking water was previously determined to be azoxystrobin and its *Z*-isomer for risk assessment purposes. However, based on new environmental fate data, the residue definition for drinking water has been revised to include azoxystrobin, its *Z*-isomer and the metabolite (2*E*)-2-(2-{[6-(2-cyanophenoxy)pyrimidin-4-yl]oxy}phenyl)-3-methoxyacrylic acid (Compound 2).

3.2.1 Determination of acute reference dose (ARfD)

To estimate acute dietary risk, the maternal NOAEL of 25 mg/kg bw/day from the gavage developmental toxicity study in rats was selected for risk assessment. At the LOAEL of 100 mg/kg bw/day, an increased incidence of diarrhea and urinary incontinence was observed in dams early in the dosing period. These effects could be the result of a single exposure and are therefore relevant to an acute risk assessment. 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 ARfD is calculated according to the following formula:

$$\text{ARfD} = \frac{\text{NOAEL}}{\text{CAF}} = \frac{25\ \text{mg/kg bw/day}}{100} = 0.3\ \text{mg/kg bw of azoxystrobin}$$

3.2.2 Acute dietary exposure and risk assessment

The acute dietary risk is calculated considering the highest ingestion of azoxystrobin that would be likely on any one day, and using food and drinking water consumption and residue values. The expected intake of residues is compared to the ARfD, which is the dose at which an individual could be exposed on any given day and expect no adverse health effects. When the expected intake of residues is less than the ARfD, the acute dietary exposure has been shown to be acceptable.

Acute food residue estimates for azoxystrobin were based on the highest average field trail (HAFT) residue levels detected in the available crop field trials, and the Canadian MRLs, American Tolerances or Codex MRLs. Residue data were translated from representative commodities in the crop groups to other commodities within the crop group according to Health Canada's guidelines. All crops were assumed to be 100% treated with azoxystrobin. Default and experimental food processing factors were applied for relevant processed commodities. The assessment considered all foods that may potentially be treated with azoxystrobin including imported foods that may be treated outside of Canada.

Residues in drinking water were estimated using environmental concentration modelling as discussed in Section 3.3.

The acute dietary exposure to azoxystrobin and its metabolites from food and drinking water was less than 44% of the ARfD for the general population and all population subgroups; and therefore, risks were shown to be acceptable. The acute dietary risk estimates are presented in Appendix IV, Table 1

3.2.3 Determination of acceptable daily intake (ADI)

To estimate risk following repeated dietary exposure, the NOAEL of 18 mg/kg bw/day from the 2-year dietary chronic toxicity/oncogenicity study in the rat was selected. At the LOAEL of 34 mg/kg bw/day, decreased body weight in both sexes, as well as decreased survival, and marked bile duct and liver pathology in male rats were noted. 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 CAF is thus 100.

The ADI is calculated according to the following formula:

$$\text{ADI} = \frac{\text{NOAEL}}{\text{CAF}} = \frac{18 \text{ mg/kg bw/day}}{100} = 0.2 \text{ mg/kg bw/day of azoxystrobin}$$

3.2.4 Chronic dietary exposure and risk assessment

Generally, the chronic dietary risk (from food and drinking water) is calculated using average consumption of different foods and drinking water, and the average residue values on those foods and drinking water. The estimated exposure is then compared to the ADI, which is an estimate of the level of daily exposure to a pesticide residue that, over a lifetime, is believed to have no significant harmful effects. When the estimated exposure is less than the ADI, the chronic dietary exposure is shown to be acceptable.

Chronic food residue estimates for azoxystrobin were based on the median residue levels detected in the available crop field trials and Canadian MRLs, American Tolerances or Codex MRLs. Residue data were translated from representative commodities in the crop groups to other commodities within the crop group according to Health Canada's guidelines. All crops were assumed to be 100% treated with azoxystrobin.

Default and experimental food processing factors were applied for relevant processed commodities. The assessment considered all foods that may potentially be treated with azoxystrobin including imported foods that may be treated outside of Canada.

Residues in drinking water were estimated using environmental concentration modelling as discussed in Section 3.3.

Chronic dietary exposures from food and drinking water were less than 24% of the ADI for the general population and all population subgroups; and therefore, risks were shown to be acceptable. The chronic dietary risk estimates are presented in Appendix IV, Table 2.

3.2.5 Cancer assessment

There was no evidence of tumourigenicity in the available azoxystrobin toxicology database and therefore, a cancer risk assessment was not necessary.

3.3 Exposure from drinking water

3.3.1 Concentrations in drinking water

The estimated environmental concentrations (EECs) in potential sources of drinking water were modelled for the combined residue of azoxystrobin, its *Z*-isomer and Compound-2. The EECs were calculated for surface water and groundwater using the Pesticide Water Calculator model (PWC, version 1.52). Modelling for surface water used a standard Level 1 scenario, a small reservoir adjacent to an agricultural field. EECs in groundwater were calculated by selecting the highest EEC from several selected scenarios representing different regions of Canada. All scenarios were run for 50 years.

The use pattern modelled was 2 applications of 1920 g a.i./ha and 780 g a.i/ha with an interval of 7 days between applications. Modelling used initial application dates between March and November.

Table 1 Level 1 Estimated environmental concentrations of the combined residue in potential sources of drinking water

Use pattern	Groundwater (µg a.i./L)		Surface water (µg a.i./L)	
	Daily[1]	Yearly[2]	Daily[3]	Yearly[4]
1920 + 780 g a.i./ha at 7-day retreatment interval	511	511	149	34

[1] 90th percentile of daily average concentrations
[2] 90th percentile of 365-day moving average concentrations
[3] 90th percentile of the peak concentrations from each year
[4] 90th percentile of yearly average concentrations

3.3.2 Drinking water exposure and risk assessment

Exposure from drinking water and food sources were combined to determine the total dietary exposure and risk. Refer to Sections 3.2.2 and 3.2.4 for the results of the acute and chronic dietary exposure and risk assessments.

3.4 Occupational and non-occupational exposure and risk assessment

Occupational and non-occupational (residential) risk is estimated by comparing potential exposures with the most relevant endpoint from toxicology studies to calculate a margin of exposure (MOE). This is compared to a target MOE incorporating uncertainty factors protective of the most sensitive subpopulation. If the calculated MOE is less than the target MOE, it does not necessarily mean that exposure will result in adverse effects, but mitigation measures to reduce risk would be required.

3.4.1 Toxicological reference values

3.4.1.1 Short-, intermediate- dermal

For short- and intermediate-term dermal risk assessment, a NOAEL of 1000 mg/kg bw/day (limit dose) from the 21-day dermal toxicity study in the rat was selected. No systemic treatment-related effects were observed. For residential scenarios, the target margin of exposure (MOE) is 100, which includes uncertainty factors of 10-fold for interspecies extrapolation and 10-fold for intraspecies variability. As outlined in the *Pest Control Products Act* hazard characterization section, for residential scenarios the PCPA factor was reduced to onefold. The selection of this study and target MOE is considered to be protective of all populations including the unborn children of exposed women.

Similarly, for occupational scenarios, the target MOE for this endpoint is 100. Ten-fold factors were applied each for interspecies extrapolation and intraspecies variability. 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.

3.4.1.2 Short-, intermediate-term inhalation

For short- and intermediate-term exposures via the inhalation route, there was no suitable repeat-dose inhalation toxicity study upon which to base the risk assessment. In the absence of a suitable route-specific study, an oral toxicity study was selected for inhalation risk assessment. Two co-critical studies, a 12-month dog oral toxicity study (capsule) and a gavage developmental toxicity study in rats, were deemed appropriate for short- and intermediate-term scenarios. A NOAEL of 25 mg/kg bw/day from the 12-month capsule dog toxicity study was selected for risk assessment based on increased liver weight, altered clinical chemistry, decreased absolute brain weights (males) and altered clinical signs including diarrhea (females) in dogs. A NOAEL of 25 mg/kg bw/day from the rat developmental toxicity study was selected for risk assessment based on decreased body weight, diarrhea and urinary incontinence in maternal rats.

For residential scenarios, the target MOE selected for these endpoints is 100. Ten-fold factors were applied each for interspecies extrapolation and intraspecies variability. As outlined in the *Pest Control Products Act* hazard characterization section, the PCPA factor was reduced to onefold. The selection of this study and target MOE is considered to be protective of all populations including the unborn children of exposed women.

Similarly, for occupational scenarios, the target MOE selected for these endpoints is 100. Ten-fold factors were applied each for interspecies extrapolation and intraspecies variability. The selection of this study and target MOE is considered protective of all populations, including nursing infants and the unborn children of exposed female workers.

3.4.1.3 Long-term dermal and inhalation

For long-term exposures via the dermal and inhalation routes, there were no long-term repeat-dose dermal or inhalation toxicity studies upon which to base the risk assessment. In the absence of a suitable route-specific study, an oral toxicity study was selected. The two-year dietary chronic toxicity/carcinogenicity rat study was deemed appropriate for these scenarios. A NOAEL of 18 mg/kg bw/day was selected for risk assessment based on decreased body weight in both sexes, as well as decreased survival, and marked bile duct and liver pathology in male rats observed at the LOAEL of 34 mg/kg bw/day.

For residential scenarios, the target MOE is 100. Ten-fold factors were applied each for interspecies extrapolation and intraspecies variability. As outlined in the *Pest Control Products Act* hazard characterization section, the PCPA factor was reduced to onefold. The selection of this study and target MOE is considered protective of all populations including the unborn children of exposed women.

Similarly, for occupational scenarios, the target MOE for this endpoint is 100. Ten-fold factors were applied each for interspecies extrapolation and intraspecies variability. The selection of this study and target MOE is considered protective of all populations, including nursing infants and the unborn children of exposed female workers.

3.4.1.4 Dermal absorption factor

A dermal absorption factor of 13% was established for long-term dermal exposure. A dermal absorption factor was not required for the short- and intermediate-term exposures since the dermal point of departure for these exposure durations is based on a dermal toxicity study.

3.4.2 Occupational exposure and risk assessment

There is potential for occupational exposure to azoxystrobin through mixing, loading, and applying the pesticide, and when entering a treated site to conduct postapplication activities

3.4.2.1 Mixer, loader, and applicator exposure and risk assessment

Based on the registered use pattern, mixer/loader/applicator exposure is expected to range from short- and intermediate-term durations (agricultural crops, seed treatment, turf) to long-term duration (greenhouse ornamentals) and to occur via both dermal and inhalation routes.

The following exposure scenarios were assessed based on the currently registered use pattern:

1) mixing/loading of liquid formulation and applying as a spray using groundboom equipment (foliar and drench applications).
2) mixing/loading of liquid formulation and applying as a spray by airblast equipment.
3) mixing/loading of liquid formulation and applying as a spray by aerial equipment.
4) mixing/loading of liquid formulation and applying as a spray using hand-held equipment (manually-pressurized handwand, mechanically-pressurized handgun, backpack sprayer, turf gun).
5) mixing/loading of liquid formulation and applying as a spray to harvested potatoes.
6) mixing/loading of wettable granule formulation and applying as a spray using groundboom equipment.
7) mixing/loading of wettable granule formulation and applying as a spray by airblast equipment.
8) mixing/loading of wettable granule formulation and applying as a spray by aerial equipment
9) mixing/loading of wettable granule formulation and applying as a spray using handheld equipment (manually-pressurized handwand, mechanically-pressurized handgun, backpack sprayer, turf gun).
10) Commercial mixing, loading, and applying liquid treatment to soybean, dry beans, corn, and canola (activities may include treating, bagging, sewing, stacking, tagging, forklift operation and cleaning).
11) On-farm mixing, loading and applying liquid seed treatment to dry beans; planting treated dry bean seed.
12) Planting of commercially treated seed (activities may include loading treated seeds).

Exposure to workers treating agricultural crops and turf were estimated using exposure values from the Agricultural Handlers Exposure Task Force (AHETF), the Pesticide Handlers Exposure Database (PHED), and the Outdoor Residential Task Force for workers wearing baseline personal protective equipment (PPE) consisting of a long-sleeved shirt, long pants, and chemical-resistant gloves.

Azoxystrobin is registered for seed treatment. PHED and AHETF scenarios were not considered to be representative of exposure to workers treating or handling treated seed. Surrogate commercial and on-farm seed treatment exposure studies, as well as exposure studies for planting treated seeds were used to estimate worker exposure. These are the best data available for the assessment of worker exposure during the treatment and handling of seeds.

Short- to intermediate-term (agriculture, seed treatment, turf, outdoor ornamentals, and post-harvest potatoes) and long-term (greenhouse ornamentals) dermal and inhalation risks were assessed. Dermal and inhalation risks were not combined as there is no common endpoint of concern for dermal and inhalation routes of exposure. A dermal absorption factor of 13% was established for long-term dermal exposure. A dermal absorption factor was not required for the short- and intermediate-term exposure since the dermal point of departure for these exposure durations is based on a dermal toxicity study.

The risk assessment for mixer/loader/applicator is presented in Appendix V, Table 1 to 6.

For all uses, the calculated dermal and inhalation MOEs exceeded the target MOE of 100 for workers wearing a single layer of PPE (long sleeved shirt, long pants) and chemical-resistant gloves. Therefore, occupational mixer/loader/applicator risks were shown to be acceptable under current conditions of use. No additional mitigation measures are proposed.

Handheld mist blower/airblast or handheld fogging equipment is not expected to be used for azoxystrobin application in greenhouses. To meet the current labelling standards, a standard label statement prohibiting the use of this equipment in greenhouse is proposed (Appendix IX).

For the commercial seed treatment risk assessment, risks were found to be acceptable as all target MOEs were met for all activities. For canola, soybeans, and dry beans, mid-level PPE (coveralls over long-sleeved shirt, long pants) and chemical-resistant gloves are proposed for all activities. For corn seed, single layer PPE (long sleeved shirt, long pants) is proposed for all activities; chemical-resistant gloves are only required for treating/application and cleaning. For all commercial seed treatment scenarios, a closed mix/load system is proposed. The results of the commercial seed treatment risk assessment are summarized in Appendix V, Table 7.

For the on-farm seed treatment and planting risk assessment, target MOEs were met and risks were found to be acceptable for all activities at single layer PPE (long sleeved shirt, long pants), chemical-resistant gloves, and with an open mix/load system. Although a closed-cab planter was used in the study to estimate exposure during planting, the calculated MOEs well exceeded the target MOE providing a sufficient margin to address the protection that would be provided by a closed-cab. As such, closed-cab mitigation measures are not required for this scenario. The results of the on-farm seed treatment and planting risk assessment are summarized in Appendix V, Table 8).

3.4.2.2 Postapplication worker exposure and risk assessment

The occupational postapplication risk assessment considered exposures to workers who enter treated sites to conduct agronomic activities involving foliar contact (for example, scouting).

There is potential exposure to workers entering treated sites or handling treated commodities. Possible occupational postapplication workers scenarios include:

- Workers entering treated outdoor and indoor (greenhouses) sites
- Workers in post-harvest treatment facilities
- Workers planting treated seed

For workers entering treated fields and greenhouses to conduct postapplication activities, dermal exposure is considered to be the primary route of exposure. Considering the low volatility of this active ingredient and assuming at least 12 hours have passed before re-entry, inhalation exposure to azoxystrobin is not expected for postapplication workers re-entering treated sites. Based on the registered use pattern, there is potential for short- and intermediate-term postapplication exposure to azoxystrobin for workers in treated fields/turf and long-term exposure for workers entering treated greenhouses.

The current product labels do not provide information regarding the type of ornamentals grown in greenhouses and outdoors that can be treated with azoxystrobin. Consequently, ornamentals (except cut flowers) and ornamentals grown for cut flowers are considered in the current assessment.

Exposure of workers entering treated fields and greenhouses was estimated using activity-specific transfer coefficients (TCs) and default dislodgeable residue (DFR) or turf transferrable residue (TTR) values. The DFR or TTR refers to the amount of residue that can be dislodged or transferred from a surface, such as leaves of a plant. The TC is a measure of the relationship between exposure and DFRs for individuals engaged in a specific activity and is calculated from data generated in field exposure studies. The TCs are specific to a given crop and activity combination and reflect standard agricultural work clothing worn by adult workers. The activity-specific TC from the Agricultural Re-Entry Task Force (ARTF) was used. Additional assumptions included an 8-hour workday for all activities, except for harvesting of ornamentals (5 hrs), and an average worker body weight of 80 kg. The long-term exposure estimates for workers conducting postapplication activities in greenhouse ornamentals were adjusted for a 13% dermal absorption factor.

Due to the limitations of the available azoxystrobin DFR study, default peak (on the day of application; day 0) and 30-day time-weighted average DFR values were calculated assuming a 25% residue deposition following a single or multiple applications (minimum re-treatment interval (RTI) as per current product labels). A residue dissipation rate of 10% per day for outdoor uses and a residue dissipation rate of 2% per day for greenhouse ornamental uses were assumed. For turf uses, peak TTR values were calculated assuming a 1% residue deposition following multiple applications at the maximum application rate with a minimum RTI (as per current label directions). A residue dissipation rate of 10% per day was assumed.

For workers entering a treated site, restricted-entry intervals (REIs) are calculated to determine the minimum length of time required before workers can enter after application. The REI is the duration of time that must elapse for residues to decline to a level where risks are shown to be acceptable (that is, performance of a specific activity that results in exposures of azoxystrobin above the target MOE).

The risk assessment for workers conducting postapplication activities is summarized in Appendix VII,Table 1 to 3. The calculated MOEs for postapplication workers for all assessed scenarios exceeded the target MOE of 100. Therefore, postapplication risks for workers entering treated outdoor sites and greenhouses were shown to be acceptable with the following proposed label amendments:

- A retreatment interval (RTI) for barley and wheat is not currently specified on the end-use product labels containing azoxystrobin. A 21-day RTI is proposed to be added to the use directions for barley and wheat.
- A standard label statement prohibiting the use of handheld mist blower/airblast or handheld fogging equipment in greenhouse is proposed to be added to labels.
- Update standard restricted-entry intervals (REI) label statement.

For workers handling treated potatoes, potential exposure was assessed using the estimated surface residue of azoxystrobin on potato and a surrogate TC of 400 cm^2/hr (greenhouse lettuce).

The risk assessment for workers handling treated potatoes is summarized in Appendix VI, Table 4. The calculated MOEs exceed the target MOE of 100. Therefore, postapplication risks for workers handling treated potatoes were shown to be acceptable under current conditions of use. No additional mitigation measures are proposed.

Farmers loading and planting commercially treated or imported seed have the potential for short- to intermediate-term duration of exposure. Calculated MOEs exceeded the target MOE and risks were shown to be acceptable at with single layer PPE (long sleeved shirt, long pants) and chemical-resistant gloves. Although a closed-cab planter was used in the studies to estimate exposure during loading and planting, the calculated MOEs well exceeded the target MOE providing a sufficient margin to address the protection that would be provided by a closed-cab. As such, closed-cab mitigation measures are not required for this scenario. The results of the planting risk assessment are summarized in Appendix VI, Table 5.

3.4.3 Non-occupational exposure and risk assessment

Non-occupational (residential) risk assessment involves estimating risks to the general population, including adults, youth, and children, during or after pesticide application.

A residential handler exposure assessment is not required as there are no domestic-class products containing azoxystrobin registered in Canada.

There is potential for non-occupational exposure to azoxystrobin from agricultural applications (bystanders exposed to spray drift), commercially treated turf (golfers), and ornamentals (retail plants). To minimize the potential for bystander exposure, all current end-use product labels are to include a standard advisory spray drift statement.

Exposure of golfers is expected to occur mainly via the dermal route and to be of short- to intermediate-term duration. The exposure and risk assessment for golfers is summarized in Appendix VII, Table 1. Calculated dermal MOEs exceed the target dermal MOE. On this basis, the risk to golfers was shown to be acceptable under current conditions of use. No additional risk mitigation measures are proposed.

Exposure to azoxystrobin on retail plants is expected to occur via the dermal route on an intermittent basis and to be of short-term duration. It is also expected to be significantly lower than exposure of postapplication workers coming in contact with treated ornamentals (Section 3.4.2.2). Since the risks to postapplication workers were shown to be acceptable under current conditions of use, potential risks to individuals handling retail ornamentals are also considered to be acceptable with the proposed label updates.

To meet the current labelling standards, a standard label statement prohibiting the use on residential turf sites is proposed to be added to all commercial class-product labels.

To protect bystanders, a standard drift statement is proposed to be added to all commercial class-product labels

3.5 Aggregate assessment

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). Since azoxystrobin is registered for use on golf course turf, short and intermediate aggregate assessments would normally be required for postapplication dermal exposure of golfers (adults, youth and children) and dietary exposure. However, based on the toxicology assessment, there was no common endpoint of toxicity noted for dermal and dietary exposure for these durations. Therefore, an aggregate assessment combining short and intermediate term dermal exposure with dietary exposure was not required. The aggregate risk assessment was conducted for food and drinking water exposure only. The most relevant toxicological endpoints and assessment factors for acute and chronic aggregate exposure are the same as those selected for the ARfD (see Section 3.2.1) and ADI (see Section 3.2.3), respectively. Aggregate exposure and risks for azoxystrobin from food and drinking water are shown to be acceptable (see Sections 3.2.2 and 3.2.4).

3.6 Cumulative assessment

The *Pest Control Products Act* requires that Health Canada consider the cumulative exposure to pesticides with a common mechanism of toxicity. Accordingly, an assessment of a potential common mechanism of toxicity with other pesticides was undertaken for azoxystrobin. Azoxystrobin and other fungicides in the β-methoxyacrylates structural class are derived from naturally occurring strobilurins, and are known to inhibit electron transfer in mitochondria of the target fungi. The toxicological effects in mammals following exposure to strobilurins include body weight effects, changes to liver weight and diarrhea, which are considered indicative of more generalized toxicity. A common mechanism of mammalian toxicity has not been identified. Therefore, a cumulative health risk assessment is not required at this time.

3.7 Health incident reports

As of 2 February 2023, Health Canada has received 16 human, 20 domestic animal, and one food residue incident reports. Almost all incidents involved products containing other active ingredients in addition to azoxystrobin.

Approximately half of the human incidents were considered to be related to exposure to azoxystrobin. All of these incidents occurred in Canada in an occupational setting and involved minor or moderate health effects such as runny nose, general malaise, irritated skin, and nausea. Based on the low number of incidents and the transient nature of the symptoms reported, no additional mitigation measures are recommended based on the incident report review.

Half of the domestic animal incidents were considered to be related to exposure to azoxystrobin.Two cases of fish death occurred following pesticide runoff into an irrigation pond or after a product was inadvertently poured into a fish tank. In addition, the consumption of spilled seed by livestock was associated with neurological effects in a number of cows and sheep, in some cases leading to death of the animals. Although most incidents occurred in the United States and the other active ingredients found in the end-use products were considered to have a contributing role in the reported effects, the consumption of treated seed by livestock is of concern. Based on these domestic animal health concerns for livestock identified from the incident data, additional statements to reduce the likelihood of exposure of animals to treated seed are proposed to improve azoxystrobin product labels; the statements are described in (Appendix IX).

4.0 Environmental assessment

4.1 Fate and behaviour in the environment

Azoxystrobin enters the environment when applied as a foliar spray to plants or soil in furrow, soil drench, or as a seed treatment on a large variety of crops (Appendix VIII, Table 1.1 and 1.2).

Azoxystrobin has low solubility in water, is relatively non-volatile under field conditions and is not expected to volatilize from water or moist soil. Hydrolysis and soil phototransformation are not expected to be routes of dissipation in the environment. Phototransformation studies in water, including a study in natural water at pH 7.6, showed that indirect aquatic phototransformation may be a route of dissipation for azoxystrobin in the photic zone of surface waters.

In aerobic soil, azoxystrobin is moderately persistent to persistent (DT_{50} values of 56.4–248 days). Similarly, in anaerobic soil, azoxystrobin is slightly persistent with a DT_{50} of 41.6 days.

Azoxystrobin is persistent in aquatic systems based on two DT_{50}s of 236 and 512 days. No anaerobic data were submitted, therefore, azoxystrobin is considered stable under anaerobic conditions.

Azoxystrobin has moderate to low mobility in soil based on available K_{FOC} values. The GUS score and Cohen criteria both suggest that azoxystrobin is a borderline leacher to a leacher. Measured concentrations in tile drains from field sites indicated levels of azoxystrobin ranging from <LOD to 25.84 µg a.i./L. Water monitoring data (2006–2019) in groundwater found detections in 8.37% of samples at a maximum concentration of 0.37 µg a.i./L. Based on the available data, azoxystrobin has the potential to leach to groundwater.

In terrestrial field dissipation studies, the azoxystrobin DT_{50} values were found to range from 31.47 to 1317 days (80^{th} percentile of 641.1 days, n = 6) in Canadian relevant ecoregions. Data from multi-year terrestrial field dissipation studies suggest that azoxystrobin will persist in fields longer than predicted by the laboratory data. Further assessment of the data indicates that repeat application of azoxystrobin to an agricultural field may result in reduced dissipation. However, carryover of azoxystrobin and its residues to the next growing season is not a concern. Runoff assessments in one study also found detections of azoxystrobin at concentrations up to 46.24 µg a.i./L.

The only major transformation product identified in soil was R234886 (Compound 2). R234886 was found to be a major transformation product under aerobic soil conditions for all submitted study soils with a maximum formation of 29.0% AR (applied radioactivity) (Visalia). Under anaerobic conditions, R234886 reached a maximum of 70.6% AR in the one soil that was tested (Hyde Farm) at study termination. In aquatic conditions, R234886 and R230310 (Compound 9) were the only major transformation products detected; all other transformation products were less than 9% AR. R234886 was detected in the aquatic dissipation studies with a maximum formation of 19.7% AR. R230310 was detected at a maximum of 18.2% AR in the aquatic photolysis study. An aerobic soil study conducted with R234886 found the transformation product to be slightly to moderately persistent in the environment. A second study conducted with R1402173 found that transformation product to be non-persistent in the environment.

Mobility of the transformation products is described based on available K_{oc}/K_{FOC} values. R234886 was found to be slightly to moderately persistent in soil and to have very high to moderate mobility in soils. R234886 was measured in tile drain and runoff at concentrations greater than detected for parent (30.6 µg/L in tile drain and 70.8 µg/L in runoff). R230310 (Compound 9) was assessed in the turf tile drain and runoff study with maximum detections of 0.38 µg/L in tile drain and 1.28 µg/L in runoff. R401553 (Compound 28) was found to be highly to moderately mobile in soil. R402173 (Compound 30) was found to be non-persistent in soil with DT_{50} values ranging from 4.24 to 9.8 days (SFO, EFSA reported). R402173 is classified as very highly to moderately mobile. Based on the available data, R234886 is expected to leach to groundwater. R230310, R401553, and R402173 may have the potential to leach to groundwater.

The octanol/water partition coefficient (K_{ow}) is reported to be log 2.5; therefore, azoxystrobin is not expected to bioaccumulate.

For further information on the fate characterisation of azyoxystrobin, see tables in Appendix VIII, Tables 2.1, 2.2, 2.3.

4.2 Environmental risk characterization

The environmental risk assessment integrates the environmental exposure and ecotoxicology information to estimate the potential for adverse ecological effects on non-target species. This integration is achieved by comparing estimated exposure concentrations (EECs) in various environmental media (soil, water, air and food) with concentrations at which adverse effects occur (such as LC_{50}, LD_{50}, NOEC or NOEL). The EECs are estimated using standard models, which take into consideration the application rate(s), chemical properties, and environmental fate properties, including the dissipation of the pesticide between applications (see Appendix VIII, Tables 1.2, 1.3, 1.5, 4.3 and 5.1.1–5.2.13).

Ecotoxicology information includes acute and chronic toxicity data for various organisms or groups of organisms from both terrestrial and aquatic habitats including invertebrates, vertebrates, and plants. Effects metrics are the toxicity endpoints used in risk assessments that may be adjusted using uncertainty factors to account for potential differences in species sensitivity as well as varying protection goals (in other words, protection at the community, population, or individual level). Summaries of toxicity data for both terrestrial and aquatic non-target organisms are presented in Appendix VIII, Tables 3.1 and 3.2.

Initially, a screening level risk assessment is performed to identify pesticides 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. The screening level risk assessment uses simple methods, conservative exposure scenarios (for example, direct application at a maximum cumulative application rate) and the relevant effects metric. Screening level and spray drift EECs are presented in Appendix VIII, Tables 4.1, 4.2, and 4.3. Refined EECs for water are also presented in Appendix VIII, Tables 1.1, 1.2, 1.3, 1.4, 1.5.

A risk quotient (RQ) is calculated by dividing the exposure estimate by an appropriate effects metric (RQ = exposure/toxicity). The RQ is then compared to the level of concern (LOC). If the screening level RQ is below the level of concern, the risk is considered acceptable and no further risk characterization is necessary. If the screening level RQ is equal to or greater than the LOC, then a refined risk assessment is performed to further characterize the risk. A refined assessment takes into consideration more realistic exposure scenarios (such as drift and runoff to non-target habitats) and might consider different toxicity endpoints. Refinements may include further characterization of risk based on exposure modelling, monitoring data, results from field or mesocosm studies, and probabilistic risk assessment methods.

4.2.1 Risks to terrestrial organisms

Terrestrial organisms, such as earthworms, pollinators, beneficial arthropods, birds, small mammals, and terrestrial non-target vascular plants, can be exposed to azoxystrobin through direct contact with spray droplets, spray drift, contact with sprayed surfaces or from ingestion of contaminated food or treated seed.

Based on available information and maximum application rates, the current uses of azoxystrobin pose negligible risk to earthworms, bees, predatory and parasitic arthropods. Therefore, risks to these groups of organisms are acceptable and no mitigation measures are required.

For the bird risk assessment, the level of concern (LOC) was only marginally exceeded at the screening level (on-field RQs ≤1.3 for foliar application; the LOC was not exceeded for seed treatment). The LOC was not exceeded for exposure off-field or at lower exposure levels. Considering the minimal exceedances of the LOC for both foliar application and seed treatments, and that it is unlikely that 100% of a bird’s diet will consist of contaminated food under natural conditions, it was determined that the current uses of azoxystrobin pose negligible risk to birds. Further mitigation is not required.

For mammals, the level of concern was exceeded at the screening level (on-field RQs up to 5 for foliar application). The LOC was still exceeded for some uses when risks were further characterized (maximum RQ of 1.8 for turf). The screening and refined values assume that the mammal is eating 100% treated diet for approximately 100 days. After application, a mammal will not be eating a diet consisting only of azoxystrobin treated food for 100 days. Therefore, this RQ is very conservative, and this risk is not expected to occur. Similarly, in the seed treatment assessment, a potential reproduction screening level risk to small mammals was identified with an RQ of 1.2. Seeds will only be available for a short period of time before either the seed germinates or degrades under exposure to moisture.

Therefore, based on low exceedance of the LOC on-field only and that exposure to wild mammals is unlikely to be equivalent to maximum levels for significant period of time, the risks to mammals are considered acceptable. Further mitigation is not required.

Hazard statements are required on labels for both birds and mammals based on the screening assessment.

The terrestrial plant risk assessment identified potential risk at the screening level. Foliar use screening RQs for terrestrial plants ranged from <0.45 to <11.6. After refinement to account for spray drift for foliar uses, it was determined that the level of concern was still exceeded for one use, filberts, with an RQ of <1.5 to <1.8. Based on the potential risk at the screening level, buffer zones were assessed for all uses to mitigate any potential risk.

4.2.2 Risks to aquatic organisms

The aquatic risk assessment determined that the level of concern for all groups was exceeded at the screening level. A refined risk assessment was conducted to look at EECs based on spray drift and runoff separately. The refined risk assessment for spray drift indicated that the LOC for some groups (invertebrates, aquatic plants, fish, and amphibians) is exceeded. Therefore, buffer zones are required to mitigate the risk from foliar applications.

The refined risk assessment for runoff from the site of application also identified exceedances of the LOC for some groups of organisms (invertebrates, aquatic plants, and amphibians). Ground boom application to turf found freshwater RQs ranging from 0.5 to 9.6, with the highest RQs for freshwater algae (RQ = 9.6) and acute amphibians (RQ = 8.1). The refined marine RQs ranged from 1 to 2.4. In general, the exceedances of the LOC for marine areas are relatively low.

A Level 1 (screening) cranberry risk assessment was conducted based on the most sensitive aquatic organism endpoint, *Navicula pelliculosa* ($EbC_{50}/2$ = 0.007 mg a.i./L). Four scenarios were modelled to bracket the potential risk to aquatic organisms. EECs were generated for both the in-field floodwaters and for water concentrations after mixing with receiving waters. The associated RQ for the floodwaters ranges from 19–74, and in the receiving waters ranging from 2–7. Therefore, this screening assessment identified risk to aquatic organisms. A Level 2 cranberry risk assessment was conducted modelling the EECs with the Cranberry Model v.1.1. The scenario for the Level 2 (refined) was taken from a cranberry bog in British Columbia. EECs for both in-field floodwaters and after mixing with receiving waters were calculated and the associated RQs are 4.8 and 0.5, respectively. While the in-field water does pose a risk to aquatic organisms, it is not a long-term water body and most aquatic organisms will not use this as habitat. The LOC for receiving waters was not exceeded, thus, the risk to aquatic organisms in receiving waters is acceptable.

Standard run-off label statements are required on labels to mitigate risk to aquatic organisms from run-off. A precautionary label statement informing users of the toxicity to aquatic organisms is also required.

4.2.3 Environmental incident reports

As of 2 February 2023, three environment and two domestic animal incidents related to azoxystrobin had been submitted to Health Canada. Three were not considered relevant as they were not related to a labelled use of azoxystrobin.

A bee incident included potential exposure from a number of pesticides other than azoxystrobin, including various insecticides. Based on the presense of multiple actives that are highly toxic to bees, where azoxystrobin is practically non-toxic to bees, this incident was not considered relevant for azoxystrobin.

An incident in Texas reported that a product containing azoxystrobin, Heritage TL, was applied to turf near an irrigation pond that was also used to raise fish. After application of the product, it rained for 5 days for a total of 10 inches (25 cm) of rain. Dead catfish and perch were found on day 5 after application and more on day 7. None of the other three ponds on the property had dead fish. Flushing the pond with well water and aeration stopped any further deaths. It is not clear from the report if the product was applied according to the label.

In conclusion, based on available information, azoxystrobin is toxic to fish, and runoff to surface waterbodies may pose a risk to fish. As concluded in the environmental risk assessment for azoxystrobin, precautionary statements for runoff are required for all product labels.

4.3 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, in other words, those that meet all four criteria outlined in the policy: persistent (in air, soil, water and/or sediment), bio-accumulative, 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, azoxystrobin and its transformation products were assessed in accordance with the PMRA Regulatory Directive DIR99-0[3] and evaluated against the Track 1 criteria. Health Canada has reached the conclusion that azoxystrobin and its transformation products do not meet all of the TSMP Track 1 criteria.

Please refer to Appendix VIII, Table 6.1 for further information on the TSMP assessment.

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

4.4 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*.[4] The list is used as described in the PMRA Science Policy Note SPN2020-01[5] and is based on existing policies and regulations, including the *Toxic Substances Management Policy* and *Formulants Policy*,[6] and taking into consideration the *Ozone-depleting Substances and Halocarbon Alternatives Regulations* under the *Canadian Environmental Protection Act, 1999,* (substances designated under the *Montreal Protocol*).

Health Canada has reached the conclusion that azoxystrobin does not contain any formulants or contaminants identified in the *List of Pest Control Product Formulants and Contaminants of Health or Environmental Concern* and its end-use product do not contain any formulants or contaminants identified in 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 Health Canada formulant initiatives and Regulatory Directive DIR2006-02.

5.0 Value assessment

Azoxystrobin is a systemic fungicide with protectant, curative and eradicative properties. It inhabits spore germination and mycelial growth, and demonstrates antisporulant activity. Azoxystrobin belongs to the resistance management Mode of Action (MoA) group 11.

Azoxystrobin is one of the few fungicides registered in Canada for fungal disease control on a wide range of crops including greenhouse and outdoor ornamentals, vegetables and fruit crops, cereals and turf. It is also registered as a seed treatment for vegetables, oil seeds, beans, corn, soybean and post-harvest control of diseases on potatoes and sweet potatoes.

The antisporulant activity of azoxystrobin is of particular importance in disease management because many of the fungal pathogens such as mildews are polycyclic and reduction of spore production can inhibit further disease development. Furthermore, post-infection application of azoxystrobin reduces disease development due to its curative and eradicative properties.

All registered uses of azoxystrobin are proposed for continued registration with some mitigation measures. The proposed risk mitigation measures do not have a significant impact on use.

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4 SI/2005-114, last amended on June 24, 2020. See Justice Laws website, Consolidated Regulations, *List of Pest Control Product Formulants and Contaminants of Health or Environmental Concern.*

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

6 DIR2006-02, *Formulants Policy and Implementation Guidance Document*

List of abbreviations

↑	increased
↓	decreased
♂	male
♀	female
µm	micrometre(s)
µg	microgram(s)
λmax	lambda maximum
A	acre
AB	Alberta
abs	absolute
AD	administered dose
ADI	acceptable daily intake
ADME	absorption, distribution, metabolism and elimination
A/G	albumin/globulin
AHETF	Agricultural Handlers Exposure Task Force
a.i.	active ingredient
ALP	alkaline phosphatase
ALT	alanine aminotransferase
AR	applied radioactivity
ARfD	acute reference dose
ARTF	Agricultural Re-entry Task Force
AST	aspartate aminotransferase
atm	atmosphere
AUC	area under the curve
AZY	Azoxystrobin
BAF	bioaccumulation factor
BC	British Columbia
BCF	bioconcentration factor
BUN	blood urea nitrogen
bw	body weight
bwg	body weight gain
°C	Celsius
C	control
Ca	calcium
CAF	composite assessment factor
CDC	United States Centers for Disease Control and Prevention
CFIA	Canadian Food Inspection Agency
cm	centimetre
cm^3	cubic centimetre
CMC	carboxymethyl cellulose
CODEX	Codex Alimentarius collection of food standards
Cp max	plasma concentration maximum
CR	chemical resistant
d	day
DA	dermal absorption
DACO	data code

DEA	dietary exposure assessment
DEEM	Dietary Exposure Evaluation Model
DFOP	double first order in parallel
DFR	dislodgeable foliar residue
DT_{50}	dissipation time to reach 50 percent of the initial concentration
DT_{90}	dissipation time to reach 90 percent of the initial concentration
DR	dose response
EbC_{50}	effective biomass concentration
EC_{50}	effective concentration
EDE	estimated daily exposure
EEC	estimated environmental concentration
EFSA	European Food Safety Authority
ER_{50}	effective response
F0	parental animals
F_1	1st generation offspring
$F_{1a,b}$	1st generation offspring in two consecutive litters, a=first and b=second
F_2	2nd generation offspring
$F_{2a,b}$	2nd generation offspring in two consecutive litters, a=first and b=second
fc	food consumption
fe	food efficiency
FCID™	Food Commodity Intake
F_{INT}	foliar deposition fraction
FW	food weight
g	gram(s)
GGT	gamma-glutamyl transferase
GLP	good laboratory practice
GSD	geometric standard deviation
GUS	groundwater ubiquity score
h	hour
ha	hectare
HAFT	highest average field trail
HDT	high dose tested
HED	health evaluation directorate
hr(s)	hour(s)
IORE	indeterminate order rate equation
*K*d	soil adsorption coefficient
K_F	Freundlich adsorption coefficient
K_{FOC}	Freundlich organic carbon adsorption coefficient
kg	kilogram
K_{oc}	organic carbon
K_{ow}	octanol-water coefficient
L	litre(s)
lb	pound
LC_{50}	lethal concentration required to kill 50% of the test group
LD	lactation day
LD_{50}	lethal dose required to kill 50% of the test group
LOAEL	lowest observed adverse effect level
LOC	level of concern

LOER	lowest observed effect rate
LR_{50}	lethal response
m^3	cubic metre
MAS	maximum irritation score
max	maximum
MB	Manitoba
mg	milligram(s)
min	minute(s)
MIS	minimum irritation score
mL	millilitre(s)
mPa	millipascal (s)
MMAD	mass median aerodynamic diameter
MOE	margin of exposure
mol	mole
MRID	master record identification number (USEPA)
MRL	maximum residue limits
MTD	maximum tolerated dose
n	number
NA	not available
N/A	not applicable
NaCl	sodium chloride
NB	New Brunswick
NCHS	National Center for Health Statistics
ND	non-detect
NFL	Newfoundland
NHANES	National Health and Nutrition Examination Survey
No.	number
NOAEL	no observed adverse effect level
NOEC	no effect concentration
NOED	no effect dose
NOEL	no effect level
NOER	no effect response
NS	Nova Scotia
OECD	Organization for Economic Co-operation and Development
ON	Ontario
nss	not statistically significant
Pa	Pascals
PCP	Pest control products
PCPA	*Pest Control Product Act*
PDP	Pesticide Data Program
PEI	Prince Edward Island
PHED	Pesticide Handlers Exposure Database
PMRA	Pest Management Regulatory Agency
PND	post-natal day
PPE	personal protective equipment
ppm	parts per million
PWC	Pesticide Water Calculator model
QC	Quebec

QSAR	quantitative structure activity relationship
RD	residue definition
REI	restricted-entry interval
rel	relative
RQ	risk quotient
RTI	re-treatment interval
SFO	single first order
SK	Saskatchewan
SPN	Science Policy Note
ss	statistically significant
$t_{1/2}$	half-life
TC	transfer coefficient
TLC	thin layer chromatography
Tr	representative half-life
t.s.	test substance
TSMP	Toxic Substance Management Policy
TTR	turf transferable residue
UF	uncertainty factor
UDS	unscheduled DNA synthesis
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
wt	weight
wk	week
WWEIA	What We Eat in America

Appendix I Registered products containing azoxystrobin in Canada

Table 1 Products containing azoxystrobin subject to proposed label amendments[1]

Registration number	Marketing class	Registrant	Product name	Formulation type	Net contents[1]	Guarantee
31420	Technical	Agrogill Chemicals Pty Ltd	Azoxystrobin Agrogill Technical Grade Active Ingredient	Solid	25 Kg	Azoxystrobin 98.9%
31723		Sharda Cropchem Limited	Sharda Azoxystrobin Technical		50–1050 Kg, Bulk	Azoxystrobin 98.40%
32045		ADAMA Agricultural Solutions Canada Ltd.	ADAMA Azoxystrobin Technical		50–1050 Kg	Azoxystrobin 97.5%
32429		NewAgco Inc.	NewAgco Inc. Azoxystrobin Technical		2–250 Kg	Azoxystrobin 98.6%
34456		Farmer’s Business Network Canada, Inc.	FBN Azoxystrobin Technical		1 Kg – Bulk	Azoxystrobin 98.8%
34205		CAC Chemical Americas LLC	CAC Azoxystrobin Technical		25–200 Kg	Azoxystrobin 98.53%
31722		Albaugh LLC	Albaugh Azoxystrobin technical grade active ingredient		200–1050 Kg	Azoxystrobin 99%
33079		Parijat Industries India Pvt. Ltd	Parijat Azoxystrobin Technical		1–250 Kg	98.8% Azoxystrobin
34468		Lanxess Corporation	Lanxess Azoxystrobin Technical		10–1200 Kg	Azoxystrobin 98.8%
26152		Syngenta Canada, Inc.	Azoxystrobin Technical		250 Kg	Azoxystrobin 96%
28232	Manufacturing	Syngenta Canada, Inc.	Azoxystrobin Millbase MUP Fungicide	Suspension	1000 L	Azoxystrobin 50%

Registration number	Marketing class	Registrant	Product name	Formulation type	Net contents[1]	Guarantee
31074	Commercial	Syngenta Canada Inc.	QUILT XCEL™ Fungicide	Suspension	1–1000 L	Azoxystrobin 143 g/L; Propiconazole 124 g/L
32015		Syngenta Canada Inc.	EXEMPLA®	Suspension	0.5–1000 L	Azoxystrobin 225 g/L; Difenoconazole 225 g/L
32418		Sharda Cropchem Limited	Zoxy Fungicide	Suspension	1–1000 L	Azoxystrobin 250 g/L
31523		Syngenta Canada Inc.	MURAL™ Fungicide	Wettable granules	0.5 L- Bulk	Azoxystrobin 30%; Benzovindiflup yr 15%
33729		Parijat Industries India Pvt. Ltd	EMISSARIU S Fungicide	Suspension	1–1000 L	Azoxystrobin 250 g/L
28394		Syngenta Crop Protection Canada Inc.	DYNASTY® 100FS Fungicide	Suspension	1–450 L, Bulk	Azoxystrobin 100 g/L
26155		Syngenta Canada Inc.	HERITAGE® Fungicide	Wettable granules	0.5–10 Kg	Azoxystrobin 500 g/Kg
33022		Syngenta Canada Inc.	A21461 Fungicide	Suspension	0.5–1000 L	Azoxystrobin 100 g/L; Pydiflumetofen 75 g/L; Propiconazole 125 g/L
32878		Sharda Cropchem Limited	Sharda Fungtion SC	Suspension	1–1000 L	Azoxystrobin 75 g/L; Propiconazole 125 g/L
33349		Syngenta Canada Inc.	VIBRANCE® CINCO Seed Treatment	Suspension	1 L- Bulk	Azoxystrobin12 .8 g/L; Fludioxonil 32.0 g/L; Metalaxyl-M and S-Isomer 25.5 g/L; Sedaxane 64.1 g/L; Thiabendazole 256.2 g/L
32263		Sharda Cropchem Limited	Azoshy 250 SC	Suspension	1–1000 L	Azoxystrobin 250 g/L

Registration number	Marketing class	Registrant	Product name	Formulation type	Net contents[1]	Guarantee
33391		Syngenta Canada Inc.	MIRAVIS® Neo 300SE ADEPIDYN® technology	Suspension	0.5–1000 L	Azoxystrobin 100 g/L; Propiconazole 125 g/L; Pydiflumetofen 75 g/L
30254		Syngenta Canada Inc.	AZOXY Flowable Fungicide	Suspension	1–1000 L	Azoxystrobin 250 g/L
31524		Syngenta Canada Inc.	ELATUS™ Fungicide	Wettable granules	0.5–1000 L	Azoxystrobin 30%; Benzovindiflupyr 15%
31126		ADAMA Agricultural Solutions Canada Ltd.	TOPNOTCH® Fungicide	Suspension	1–10 L	Azoxystrobin 143 g/L; Propiconazole 124 g/L
28393		Syngenta Canada Inc.	HERITAGE MAXXTM Fungicide	Emulsifiable concentrate	0.5–37.8 L	Azoxystrobin 95%
33807		NewAgco, Inc.	QUASI Fungicide	Suspension	1–1000 L	Azoxystrobin 250 g/L
31973		Syngenta Canada Inc.	ELATUS® A Fungicide	Suspension	1–1000 L	Azoxystrobin 250 g/L
32416		Sharda Cropchem Limited	Azoxystar Fungicide	Suspension	1–1000 L	Azoxystrobin 250 g/L
32417		Sharda Cropchem Limited	Super Azoxy Fungicide	Suspension	1–1000 L	Azoxystrobin 250 g/L
32905		Sharda Cropchem Limited	AZOSHY 50 WDG Fungicide	Wettable granules	0.1–5 KG	Azoxystrobin 50%
34408		Albaugh LLC	AZOXY 250 SC	Suspension	1–1000 L	Azoxystrobin 250 g/L
26153		Syngenta Canada Inc.	QUADRIS® Flowable Fungicide	Suspension	1–1000 L	Azoxystrobin 250 g/L
30489		ADAMA Agricultural Solutions Canada Ltd.	MANA Azoxystrobin 250 Fungicide	Suspension	1–10 L	Azoxystrobin 250 g/L

Registration number	Marketing class	Registrant	Product name	Formulation type	Net contents[1]	Guarantee
31050		Syngenta Canada Inc.	STADIUM® Fungicide	Suspension	0.5–1000 L	Azoxystrobin143 g/L; Fludioxonil 143 g/L; Difenoconazole 112 g/L
29295		Syngenta Canada Inc.	HEADWAY® Fungicide	Emulsifiable concentrate	0.5–450 L	Azoxystrobin 62.4 g/L; Propiconazole 103.9 g/L
29871		Syngenta Canada Inc.	MAXIM® QUATTRO Seed Treatment	Suspension	5 L to Bulk	Azoxystrobin1.33%; Fludioxonil 3.32%; Metalaxyl-M and S-Isomer 2.65%; Thiabendazole 26.5%
28328		Syngenta Canada Inc.	QUILT® Fungicide	Suspension	1–1000 L	Azoxystrobin 75 g/L; Propiconazole 125 g/L
33672		ADAMA Agricultural Solutions Canada Ltd.	CUSTODIA Foliar Fungicide	Suspension	1–1050 L	Azoxystrobin 120 g/L; Tebuconazole 200 g/L
32184		Syngenta Canada Inc.	TRIVAPRO® A Fungicide	Suspension	1–1000 L	Azoxystrobin 75 g/L; Propiconazole 125 g/L
30518		Syngenta Canada Inc.	QUADRIS TOP® Fungicide	Suspension	0.5–1000 L	Azoxystrobin 200 g/L; Difenoconazole 125 g/L
33798		Syngenta Canada Inc.	A22070 Fungicide	Suspension	0.5 L to Bulk	Azoxystrobin 62.5 g/L; Propiconazole 104 g/L; Pydiflumetofen 10.2 g/L
34229		ADAMA Agricultural Solutions Canada Ltd.	Quali-Pro Strobe 50 WG	Wettable granules	100 g - Bulk	Azoxystrobin 50%

Registration number	Marketing class	Registrant	Product name	Formulation type	Net contents[1]	Guarantee
34408		ALBAIGH LLC	Azoxy 250 SC	Suspension	1–1000 L	Azoxystrobin 250 g/L
34616		Syngenta Canada Inc	A23089 Fungicide	Suspension	0. 1000 L	Azoxystrobin 125 g/L; Pydiflumetofen 75 g/L; Difenoconazole 125 g/L

[1] as of 12 September 2022, excluding discontinued products or products with a submission for discontinuation.

Appendix II Registered uses of azoxystrobin in Canada

Table 1 Registered commercial uses of azoxystrobin in Canada[1,2]

Site(s)[3]	Pest(s)	Formulation Type	Application method	Application rate[4] (g a.i./ ha) Maximum single	Maximum cumulative	Maximum number of application per year[4]	Minimum interval between applications (days)[4,5]
Use-site category 6/27 – Greenhouse Non-Food Crops/Ornamentals Outdoor							
Greenhouse and outdoor ornamentals-foliar	Alternaria leaf spot, anthracnose, Botrytis blight and grey mould, Cercospora leaf spot, downy mildew, powdery mildew, rust, Pythium Root Rot, Rhizoctonia Root, Crown and Stem Rots	Emulsifiable concentrate, wettable granular	Ground equipment (broadcast, banded or directed spray application) (field sprayer, airblast)	304	608	2	7
Use-site category 27 – Ornamentals Outdoor							
Daylilies	Daylily rust	Wettable granules	Ground [Typically manual fill of the sprayer, vertical boom sprayer (high-volume sprayer), robotics, or Backpack/ spot spray.]	141	282	2	14
Use-site category 10 – Seed and Plant Propagation Materials Food and Feed							
Canola	Seed decay, damping-off and seedling blight	Suspension	Standard slurry seed treatment	1.6	1.6	1	N/A
Corn (field)				0.32	0.32	1	
Corn (pop, sweet)				0.15	0.15	1	
Root vegetables, except ginseng	Rhizoctonia seed rot/pre-emergence damping-off	Suspension	Seed treatment – For import uses only	(0.23 carrot), (1.7 radish), (0.06 sugar beet), (0.14 turnip)	(0.23 carrot), (1.7 radish), (0.06 sugar beet), (0.14 turnip)	1	
Bulb vegetables	Rhizoctonia seed rot/pre-emergence damping-off	Suspension	Seed treatment – For import uses only	(0.23 bulb onion), (0.35 green onion), (50 garlic)	(0.23 bulb onion), (0.35 green onion), (50 garlic)	1	N/A

Site(s)[3]	Pest(s)	Formulation Type	Application method	Application rate[4] (g a.i./ ha)		Maximum number of application per year[4]	Minimum interval between applications (days)[4,5]
				Maximum single	Maximum cumulative		
Leafy vegetables	Rhizoctonia seed rot/pre-emergence damping-off	Suspension	Seed treatment – For import uses only	(0.1 lettuce), (0.007 celery), (0.6 spinach)	(0.1 lettuce), (0.007 celery), (0.6 spinach)	1	N/A
Brassica (cole) leafy vegetables	Rhizoctonia seed rot/pre-emergence damping-off	Suspension	Seed treatment – For import uses only	(0.0175 broccoli, cabbage, cauliflower), (0.56 mustard)	(0.0175 broccoli, cabbage, cauliflower), (0.56 mustard)	1	N/A
Fruiting vegetables	Rhizoctonia seed rot/pre-emergence damping-off	Suspension	Seed treatment – For import uses only	(0.055 tomato), (0.01 pepper), (0.015 eggplant)	(0.055 tomato), (0.01 pepper), (0.015 eggplant)	1	N/A
Cucurbit Vegetables	Rhizoctonia seed rot/pre-emergence damping-off	Suspension	Seed treatment – For import uses only	(0.25 cucumber), (0.124 squash)	(0.25 cucumber), (0.124 squash)	1	N/A
Dry beans (Lupinus spp.)	Anthracnose, seed rot/pre-emergence damping-off, postemergence damping-off, and seedling root rot	Suspension	Standard slurry seed treatment	0.83	0.83	1	N/A
Soybean	Seed decay, damping-off and seedling blight, Pre- and post emergence damping -off	Suspension	Standard slurry seed treatment	2.21	2.21	1	N/A
Sunflower	Seed rot/pre-emergence damping-off, downy mildew	Suspension	Seed treatment – For Import Uses Only	2.5	2.5	1	N/A
Use-site category 12 – Stored Food and Feed							
Sweet potatoes-post harvest	Fusarium rot, Rhizopus rot	Suspension concentrate	(In-line Aqueous Spray Application)	4.65 g a.i/tonne	4.65 g a.i/tonne	1	N/A
Potato-post harvest	Fusarium dry rot, silver scurf	Suspension concentrate		4.65 g a.i/tonne	4.65 g a.i/tonne	1	N/A
Use-site category13/14 – Terrestrial Feed/Food Crops							
Barley	Barley scald, barley net blotch, barley leaf rust, Septoria leaf spot, tan spot	Suspension	Ground and aerial	75.8	150	2	Not stated*

Site(s)[3]	Pest(s)	Formulation Type	Application method	Application rate[4] (g a.i./ ha)		Maximum number of application per year[4]	Minimum interval between applications (days)[4,5]
				Maximum single	Maximum cumulative		
Oats	Barley net blotch, crown rust, Septoria leaf spot	Suspension	Ground and aerial	75.8	150	2 (typical 1)	Not stated*
Rye	Barley scald, Septoria leaf spot, tan spot	Suspension	Ground and aerial	75.8	150	2 (typical 1)	Not stated*
Triticale	Septoria leaf spot, tan spot	Suspension	Ground and aerial	75.8	150	2	Not stated*
Wheat	Septoria leaf spot, tan spot, stripe rust	Suspension	Ground and aerial	75.8	150	2	Not stated*
Canola	Alternaria black Spot, virulent blackleg, Sclerotinia stem rot	Suspension	Ground and aerial	250	500	2	Not stated*
Carrot	Leaf blight, Cercospora leaf spot	Suspension	[Ground boom – farmer]	200	600	3	7
Carrot – in furrow	Rhizoctonia root rot, crown rot, stem canker	Suspension	[Ground boom – farmer]	500	500	1	N/A
Corn[6] (field, sweet including seed production, pop including seed production)	Rust, northern corn leaf blight, southern corn leaf bight, eye Spot, grey leaf spot, Anthracnose leaf Blight	Wettable granular, suspension	Ground and aerial	113.4	300	4	7
Crop Subgroup 20A	Sclerotinia stem rot	Suspension	Ground and aerial	124.4	124.4	1	N/A
Crop Group 6A, 6B and 6C (legume vegetables)	Asian (soybean) rust, powdery mildew	Suspension	Ground and aerial	125	250	2	14
Fescue, growing for seed production.	Stem eyespot and leaf spot complex, leaf spot	Suspension	Ground	75	150	2	Not Stated*
Potato – foliar	Early blight	Suspension	Ground and aerial	200	600	3	7
Potato in-furrow	Silver Scurf, Rhizoctonia Stem and stolon Canker, Black Scurf	Suspension	[Ground boom – farmer/ custom]	200	200	1	N/A

Site(s)[3]	**Pest(s)**	**Formulation Type**	**Application method**	**Application rate[4] (g a.i./ ha)**		**Maximum number of application per year[4]**	**Minimum interval between applications (days)[4,5]**
				Maximum single	**Maximum cumulative**		
Use-site category14 – Terrestrial Food Crops							
Blueberry (lowbush)	Mummyberry, anthracnose, rust, valdensinia leaf spot, Septoria leaf spot – suppression	Suspension	Ground and aerial	75	225	3	7
Blueberry (highbush)	Mummyberry, anthracnose, rust, valdensinia leaf spot, Septoria leaf spot – suppression	Suspension	Ground – airblast	75	300	4	7
Berry, Low Growing, (subgroup 13-07G, except blueberry and cranberry)	Anthracnose, Powdery Mildew	Suspension	Ground	200	600	3	7
Artichoke, Globe	Powdery Mildew, Ramularia leaf spot and bud spot-suppression	Suspension	Ground	205	820	4	14
Cabbage	Alternaria leaf spot	Suspension	[ground boom – farmer]	280	840	3	7
Caraway	Blossom blight	Suspension	[ground boom – farmer]	281.3	281.3	1	N/A
Celery	Early and late blights, anthracnose	Suspension	[ground boom – farmer/ custom]	280	840	3	7
Coriander (plants grown for seed only)	Blossom blight	Suspension	Ground – boom sprayer	281.3	281.3	1	N/A
Cranberries	Fruit rot, cottonball rot-suppression	Suspension	[airblast (highbush), Ground boom and chemigation – farmer/ custom (lowbush)]	250	750	3	7

Site(s)[3]	Pest(s)	Formulation Type	Application method	Application rate[4] (g a.i./ ha)		Maximum number of application per year[4]	Minimum interval between applications (days)[4,5]
				Maximum single	Maximum cumulative		
Crop group 3-07 (bulb vegetables)	Purple blotch, downy mildew, Botrytis leaf blight, Stemphylium leaf blight, leaf blotch	Suspension	[ground boom – farmer]	200	800	4	7
Crop group 5 brassica (cole) Leafy vegetables	Alternaria blight, Cercospora leafspot - suppression, powdery mildew	Suspension	[ground boom – farmer]	200	800	4	10
Crop group 6C the dried shelled pea and bean	Ascochyta blight, Asian soybean rust, rust, mycosphaerella blight, powdery mildew, anthracnose, Sclerotinia – suppression	Wettable granular, suspension	Ground and aerial	125	250	2	7
Crop group 8-09 fruiting vegetables	Early blight, anthracnose, powdery mildew, Septoria leaf spot	Wettable granular, suspension	[Aerial and ground boom – farmer]	125	375	3	7
Crop Group 9 Cucurbit Vegetables	Powdery mildew, Alternaria leaf blight and spot, anthracnose, Cercospora leaf spot, gummy stem blight	Wettable granular, suspension	[ground boom – farmer]	200	800	4	7
Cumin	Blossom blight – suppression	Suspension	[ground boom – farmer]	281.3	281.3	1	N/A
Daikon in-furrow	Rhizoctonia root rot, crown rot and stem canker	Suspension	[ground boom – farmer]	750	750	1	N/A
Ferns of asparagus	Purple spot disease	Suspension	[ground boom – farmer]	281.3	843.9	3	7
Ginseng	Rhizoctonia	Suspension	[ground boom – farmer]	280	280	1	One application in seeding year, one application the following spring. Two

Site(s)[3]	Pest(s)	Formulation Type	Application method	Application rate[4] (g a.i./ ha)		Maximum number of application per year[4]	Minimum interval between applications (days)[4,5]
				Maximum single	Maximum cumulative		
							applications to crop between seeding and harvest.
Ground cherries	Early blight	Suspension	[ground boom – farmer]	125	375	3	7
Garden beet in-furrow	Rhizoctonia root rot, crown rot and stem canker	Suspension	[Ground boom – farmer]	500	500	1	N/A
Hazelnuts and filberts	Eastern filbert blight	Suspension	Ground (airblast)	225	900	4	7
Horseradish in-furrow	Rhizoctonia root rot, crown rot and stem canker	Suspension	[ground boom – farmer]	200	200	1	N/A
Lentils	Anthracnose, Cercospora leaf spot	Suspension	Ground and aerial	125	250	2	7
Mint (peppermint; spearmint; susceptible mint hybrids)	Powdery mildew, rust	Suspension	Ground and aerial	75	150	2	14
Mustard seed	Virulent blackleg, Alternaria black spot	Suspension	Ground and aerial	124.4	124.4	1	N/A
Oil radish, lunaria	Alternaria black spot	Suspension	Ground and aerial	124.4	124.4	1	N/A
Parsley	Alternaria leaf blight, Septoria leaf blight	Suspension	[ground boom – farmer]	280	840	3	7
Rutabaga in-furrow	Rhizoctonia root rot, crown rot and stem canker	Suspension	[ground boom– farmer]	300	300	1	N/A
Pea including field pea	Powdery mildew, mycosphaerella blight	Suspension	Ground and aerial	219.7	439.4	2	7
Seed corn	Rust (Puccinia sorghi)	Suspension	[ground boom – farmer/ custom]	113.3	226.6	2	7
Safflower	Alternaria leaf spot	Suspension	Ground and aerial	280	280	1	N/A
Soybean	Asian (soybean) rust, Cercospora leaf spot, anthracnose, frogeye leaf spot, white	Wettable granular, suspension	Ground and aerial	219.7	439.4	2	7

Site(s)[3]	Pest(s)	Formulation Type	Application method	Application rate[4] (g a.i./ ha)		Maximum number of application per year[4]	Minimum interval between applications (days)[4,5]
				Maximum single	Maximum cumulative		
	mould, Rhizoctonia seed decay, damping-off and seedling blight, seed rot/pre-emergence damping-off, and postemergence damping off, seedling rot, early season root rot						
Spinach	Downy mildew	Suspension	Ground – farmer	281.3	562.6	2	7
Strawberry including June-bearing strawberry varieties	Black root rot	Suspension	Ground (drench and drip-irrigation) and ground boom – farmer/ custom	275	550	2	Not stated
Succulent shelled peas varieties	Ascochyta blight, powdery mildew	Suspension	Ground and aerial	125	250	2	10
Sweet potato-foliar	Early blight, black dot	Suspension, wettable granular	Ground and aerial	200	600	3	7
Tobacco	Blue mould, target spot	Suspension	[Ground boom – farmer/ custom]	217.5	652.5	3	7
Tomatoes	Early blight, anthracnose, Cercospora leaf spot	Suspension	Ground and aerial	125	375	3	7
Turnip in-furrow	Rhizoctonia root rot, crown rot and stem canker	Suspension	[Ground boom – farmer]	394.7	394.7	1	N/A
Radish in-furrow	Rhizoctonia root rot, crown rot and stem canker	Suspension	Ground	1500	1500	1	N/A
Sugar beets-foliar	Cercospora leaf spot, powdery mildew	Suspension	[Ground boom – farmer/ custom]	200	600	3	7
Sugar beets in-furrow	Rhizoctonia root and crown rot	Suspension	[Ground boom – farmer/ custom]	275	275	1	N/A

Site(s)[3]	Pest(s)	Formulation Type	Application method	Application rate[4] (g a.i./ ha)		Maximum number of application per year[4]	Minimum interval between applications (days)[4,5]
				Maximum single	Maximum cumulative		
Use-site category 30 -Turf							
Turf (golf courses, commercial turf farms)	Anthracnose, brown patch, dollar spot, fairy ring, Fusarium patch, leaf spots and melting-out, Pythium blight, red thread, summer patch, take-all patch, Waitea patch,	Emulsifiable concentrate, wettable granules	[typically manual fill of the sprayer, vertical boom sprayer (high-volume sprayer), robotics, or Backpack/ spot spray]	600	2700	17 (based on the lower rate, 152 g a.i./ha)	10
	Gray snow mould, pink snow mould	Emulsifiable concentrate, wettable granules		1920	1920	1	N/A

1 As of 12 September 2022, excluding discontinued products or products with a submission for discontinuation

2 All information is derived from registered product labels, except for information provided by registrants which is indicated by [ ], and data calculated by the PMRA which is indicated by ( ).

3 Due to the large variability of the application rates for some crops, only the highest registered rates for each crop, across all labels, is listed in this table. Some labels have lower maximum rates and registrants must maintain the application rates and yearly maximums previously approved for those labels.

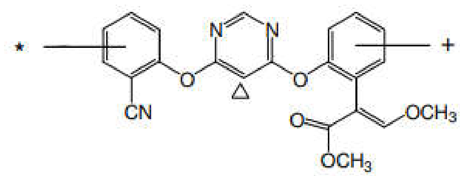
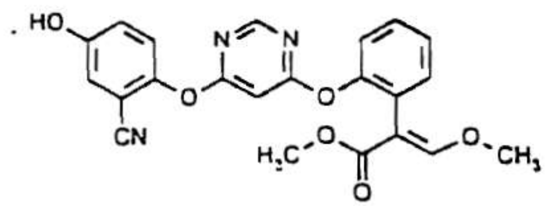
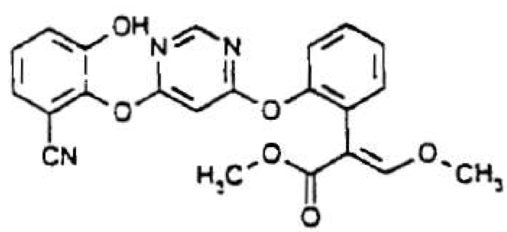
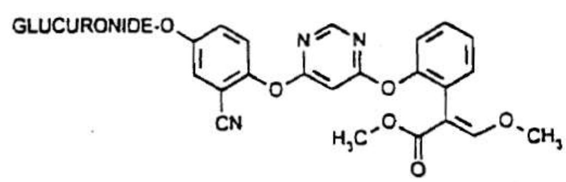
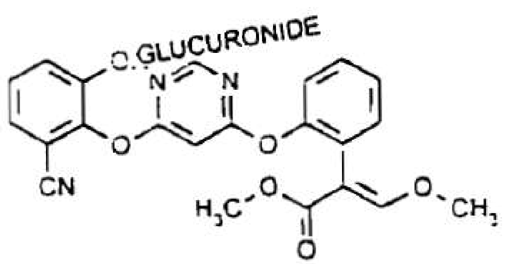
4 Due to the large variability of the application rates, maximum number of applications per year, and the re-application intervals for some crops, the reported values in this table for single maximum application rate, yearly maximum application rate, number of applications, and re-application interval may not be from the same label, and may not relate to each other.

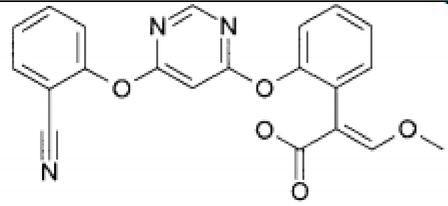
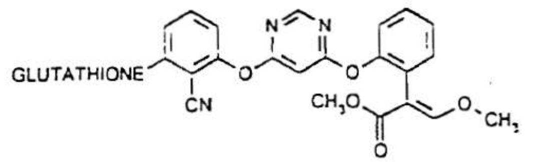
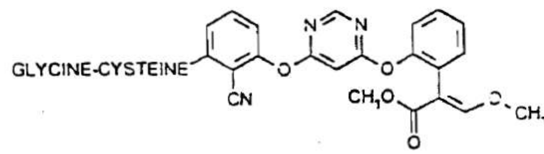
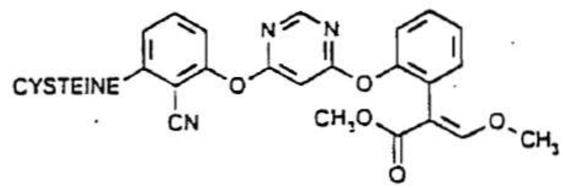
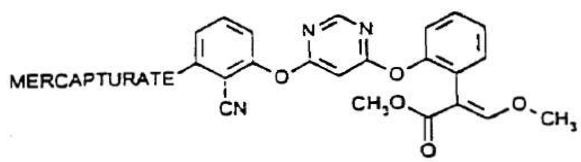
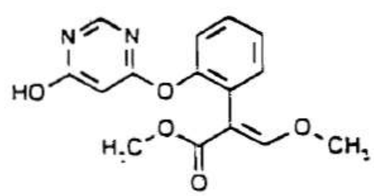
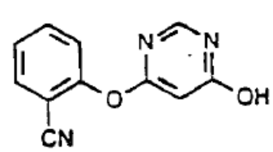
5 Use patterns with no stated re-application interval rate were assumed to have a 7-day re-application interval for the environmental risk assessment (including buffer zones and water modelling EECs).

6 Corn - this use pattern has since been updated to a lower number of applications, but the risk assessments and mitigation measures are based on the rates in the table.

Appendix III Toxicology information for health risk assessment

Table 1 Identification of azoxystrobin and select metabolites of azoxystrobin in the rat

Name/Code	Chemical name	Structure
Azoxystrobin ICIA5504 Parent	Methyl (2*E*)-2-(2-{[6-(2-cyanophenoxy)pyrimidin-4-yl]oxy}phenyl)-3-methoxyacrylate	 * [[14]C]Cyanophenyl-labelled azoxystrobin Δ [[14]C]Pyrimidinyl-labelled azoxystrobin + [[14]C]Phenylacrylate-labelled azoxystrobin
Metabolite II 8-hydroxy-5504	Methyl (2*E*)-2-(2-{[6-(2-cyano-4-hydroxyphenoxy)pyrimidin-4-yl]oxy}phenyl)-3-methoxyacrylate	
Metabolite III 10-hydroxy-5504	Methyl (2*E*)-2-(2-{[6-(2-cyano-6-hydroxyphenoxy)pyrimidin-4-yl]oxy}phenyl)-3-methoxyacrylate	
Metabolite IV (a or b) 8-hydroxy-5504-glucuronide or 10-hydroxy-5504-glucuronide Z-isomer R230310 Compound 9	Methyl (2*E*)-2-(2-{[6-(2-cyano-4-glucuronidyloxyphenoxy)pyrimidin-4-yl]oxy}phenyl)-3-methoxyacrylate Or Methyl (2*E*)-2-(2-{[6-(2-cyano-6-glucuronidyloxyphenoxy)pyrimidin-4-yl]oxy}phenyl)-3-methoxyacrylate	 

Name/Code	Chemical name	Structure
Metabolite V Major metabolite R234886 Compound 2	(2*E*)-2-(2-{[6-(2-cyanophenoxy)pyrimidin-4-yl]oxy}phenyl)-3-methoxyacrylic acid	
Metabolite VI a (b unknown isomer) 7-Glutatione-5504	Methyl (2*E*)-2-(2-{[6-(2-cyano-3-glutationylphenoxy)pyrimidin-4-yl]oxy}phenyl)-3-methoxyacrylate	
Metabolite VII 7-Cysteinyl-glycine-5504	Methyl (2*E*)-2-(2-{[6-(2-cyano-3-cysteine-glycinylphenoxy)pyrimidin-4-yl]oxy}phenyl)-3-methoxyacrylate	
Metabolite VIII 7-Cysteine-5504	Methyl (2*E*)-2-(2-{[6-(2-cyano-3-cysteinylphenoxy)pyrimidin-4-yl]oxy}phenyl)-3-methoxyacrylate	
Metabolite IX 7-Mercapturate-5504	Methyl (2*E*)-2-(2-{[6-(2-cyano-3-acetylcysteinylphenoxy)pyrimidin-4-yl]oxy}phenyl)-3-methoxyacrylate	
Metabolite X Hydroxy-pyrimidinol-phenylacrylate Compound 3	Methyl (2*E*)-2-{2-[(6-hydroxypyrimidin-4-yl)oxy]phenyl}-3-methoxyacrylate	
Metabolite XV Cyanophenoxy-hydroxypyrimidinol R401553 Compound 28	2-[(6-hydroxypyrimidin-4-yl)oxy]benzonitrile	

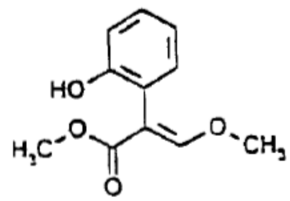
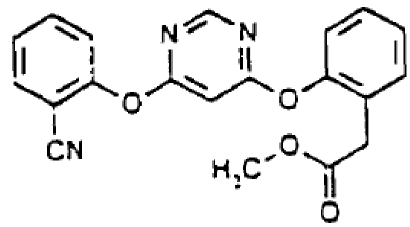
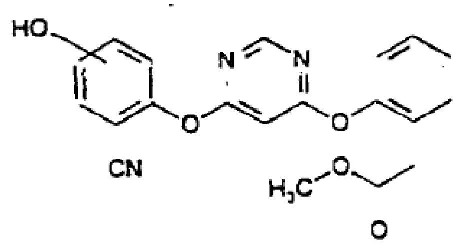
Name/Code	Chemical name	Structure
Metabolite XII Hydroxy-phenylacrylate	Methyl (2*E*)-2-(2-hydroxyphenyl)-3-methoxyacrylate	
Metabolite XIII Des-methoxy-methenyl-5504	Methyl (2-{[6-(2-cyanophenoxy)pyrimidin-4-yl]oxy}phenyl)acetate	
Metabolite XIV Hydroxy-des-methoxy-methenyl-5504	Methyl (2-{[6-(2-cyano-x-hydroxyphenoxy)pyrimidin-4-yl]oxy}phenyl)acetate	

Table 2 Toxicity Profile of Technical Azoxystrobin

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 body weights unless otherwise noted.

Study type/Animal/PMRA#	Study results
Toxicokinetic studies	
Absorption, Distribution, Metabolism and Excretion (single gavage high dose or repeated low dose) Sprague-Dawley rat PMRA# 1179762	Unlabelled azoxystrobin or 14C-azoxystrobin labelled at the pyrimidinyl, phenylacrylate, or cyanophenyl moieties; single gavage doses of 1 or 100 mg/kg bw or 15-day gavage repeated doses of 1 mg/kg bw/day; bile ducts cannulated rats were given a single gavage dose of 100 mg/kg bw. Absorption/Excretion: azoxystrobin was rapidly and extensively absorbed and excreted following oral administration. The majority of the administrated dose (AD) is excreted within 48 hours mainly in the feces (73–89%) and to a lesser extent in urine (9-18%). In bile duct cannulated rats, the majority of the AD was excreted in bile (72–74%). The remainder was excreted in the feces (15%) and urine (2–7%). Minor sex or dose regimen differences were observed. Distribution: The AD was widely distributed in all tissues by 24 and 48 hours, with minimal tissue retention (by day 7 post-dosing <1% in tissues/carcass) observed. Metabolism: 15 metabolites were identified (6 uncharacterized) and only minor

Study type/Animal/PMRA#	Study results
	sex differences were noted. The main metabolite was identified as a glucuronide conjugate of the methoxy acid on the phenylacrylate moiety (29%) of AD. The second major group of metabolites included hydroxylation and conjugations of the cyanophenyl moiety (conjugates of glucuronide, glutathione, cysteine, cysteinyl-glycine or mercapturate; <10% each). Some minor metabolites were proposed to have occurred by the process of demethoxylation of phenylacrylate acid moiety and cleavage of ether linkages (<10% each). 42–46% AD was associated with metabolites and 32% with unchanged azoxystrobin in the feces at high dose level.
Excretion and tissue retention (single gavage high dose) Sprague-Dawley CD rat PMRA# 1179761	14C-azoxystrobin labelled at the pyrimidinyl moiety, single dose of 100 mg/kg bw Excretion over 7 days, showed 89.4% AD for ♂ and 84.5% AD for ♀ in feces, and 8.5% AD for ♂ and 11.5% AD for ♀ in urine; thus a minor sex difference was apparent in the excretion profiles. Less than 92% AD was excreted during the first 48 hours. A small percentage, 4.4% of AD, was retained in the tissues (1.373/1.118 µg equivalent metabolite V/g kidney tissue in ♂/♀ respectively; in the liver: 0.812/0.714 µg equivalent/g in ♂/♀ respectively) after 7 days.
Excretion and tissue retention (repeat gavage low dose) Sprague-Dawley rat PMRA# 1179760	Unlabelled daily gavage doses of l mg/kg bw azoxystrobin, single 14C labelled at the pyrimidinyl moiety at 1 mg/kg bw dose Excretion was rapid with >96% AD being excreted during the first 48 hrs, mainly via feces. Specifically, 89.1% /86.5% of AD (♂/♀, respectively) was measured in feces, and 12.5%/17.0% of AD (♂/♀, respectively) in urine over 7 days. Little radioactivity was retained in the tissues with ~0.8% of AD present in the tissues and carcass for both sexes. The highest concentration of radioactivity present in the tissues was found in the kidneys (<0.05 µg equivalent/g), liver (<0.3µg equivalent/g) and blood (<0.01 µg equivalent/g) after 7 days.
Excretion and tissue retention (single gavage low dose) Sprague-Dawley rat PMRA# 1179759	[14C] azoxystrobin labelled at pyrimidinyl moiety at single dose of 1 mg/kg bw (4 mL/kg) Excretion occurred predominantly via feces (83.2% /72.6% AD, ♂/♀ respectively), followed by urine (10.2%/17.9% AD, ♂/♀ respectively) over 7 days. Minimal amount, <0.6% AD, was found in expired air. >86% AD was excreted during the first 48 hours, and ~0.4% AD present in the tissues and carcass for both sexes at 7 days. The highest concentration of radioactivity from residual AD was found in the kidneys (0.027 and 0.023µg equivalent/g tissue (♂/♀)), liver (0.009 µg equivalent/g (♂/♀)), blood (0.004 µg/g).
Excretion and tissue retention (single gavage low dose) Sprague-Dawley rat PMRA# 1179758	1 mg/kg bw [14C]-azoxystrobin in three radiolabeled forms [I4C] -pyrimidnyl, [14C] -phenylacrylate and [14C]-cyanophenyl No marked difference was observed in excretion or tissue distribution profiles for the three labelled forms of azoxystrobin. Distribution: In both sexes the whole body autoradiographs demonstrated radiolabelling in the kidneys and liver, but the highest concentration of radioactivity was in the intestinal contents. The predominant route of excretion of radioactivity was via feces (58–82% AD at 48 hrs), followed by urine (5–20% AD at 48 hrs). Negligible amounts of radioactivity were measured in exhaled air.

Study type/Animal/PMRA#	Study results
Absorption, Distribution, Metabolism and Excretion (single gavage low dose and high dose, and repeated gavage doses)-preliminary study Sprague Dawley rat and Beagle dog PMRA# 2807499	[14C]-azoxystrobin labelled at pyrimidinyl moiety at 200/100 mg/kg bw (bile duct cannulation) and 200 mg/kg bw (blood metabolism) in rat; plasma samples were taken from the 90-day dog study (PMRA# 1177956) Supplemental – preliminary study Rat (limited information on the dog was included): Absorption of azoxystrobin was rapid and extensive. The peak plasma concentration after single low dose was at ~30 min, with plasma t1/2 about 24 hrs. The relationship between dose and plasma concentration was non-linear in 90-day dog study. Plasma concentration was twofold higher in ♂ than ♀ after 90 days feeding in rats. After single low dose, radioactivity was not measured in plasma only, until 48 hrs post dosing when it was measured in whole blood. Metabolism of azoxystrobin was extensive. At least 7 metabolites were noted in urine, 4 metabolites in plasma, and 10 metabolites in feces after a single low dose. Major metabolite (metabolite V) was present in both plasma and urine and as glucuronic acid conjugate in bile. This metabolite was not detected in dog plasma. Pyrimidinol was formed by cleavage of either bond and the loss of cyano-phenyl ring. Excretion after a single low dose constituted of 9% AD in urine, and 77% AD in feces. The majority of AD was excreted in 3 days (86% AD post single high dose). Biliary excretion in rat after single high dose occurred significantly within 24 hrs (38%/ 44% AD at 24 hrs, ♂/♀), indicating enterohepatic recirculation.
Metabolite profile (gavage) NZW rabbit (compared to rat) PMRA# 1177981	Single dose of [14C] azoxystrobin – labelled at pyrimidinyl ring at 600 mg/kg bw in PEG. Comparison of the plasma metabolite profiles (9 peaks) for rat and rabbit by TLC show that, although there were quantitative differences, they were qualitatively similar. Acid-metabolite was the major metabolite in both rat and rabbit.
Vehicle exposure comparison (gavage) – vehicle study NZW rabbit (not pregnant) PMRA# 1177982, 1177983	Single gavage dose of unlabelled azoxystrobin on day 1 (phase 1), day 8 (phase 2) and day 15 (phase 3) at 7.5, 20 or 50 mg/kg bw/day in 1 or 2 mL corn oil kg/bw, or 5 mL CMC/kg bw Range extended to 50, 100, 200 or 400 azoxystrobin mg/kg bw in 1 mL corn oil or 5 mL CMC/kg bw; and to 50, 100, 200, 400 or 800 mg/kg bw in 2 mL corn oil/kg bw Plasma concentrations of azoxystrobin-acid (major metabolite) were considerably higher than the corresponding values for unchanged azoxystrobin, and the peak for both occurred 2–6 hours post-dosing (independent of dose volume, but later for the higher doses). Plasma concentrations plateaued ~12–48 hrs post-dose and concentrations were greatly reduced to not-detected by 48–96 hrs for azoxystrobin (slightly earlier at low dose). Plasma concentrations for azoxystrobin-acid plateaued ~72–96 hrs post-dose. There were significant variations among individual animals in the concentrations of both measured compounds. Both AUC and Cp max values for azoxystrobin and azoxystrobin-acid increased with dose level when azoxystrobin was administered in each of the vehicles. No significant differences in systemic exposure were observed between administration of azoxystrobin in corn oil or

Study type/Animal/PMRA#	Study results
	CMC vehicles, or in corn oil at dosing rates of 1 or 2 mL/kg bw, except for azoxystrobin-acid at 400 mg/kg bw in corn oil where systemic exposure was greater for dose volumes of 2 mL than 1 mL by 1.5-fold. At ≥400 mg azoxystrobin/kg bw, AUC values were lower for the CMC vehicle than for the corn oil vehicle. There were no significant differences in the degree of exposure, based on AUC measurements, following dose levels of up to 200 mg azoxystrobin/kg bw administered in any of the vehicles.
Vehicle exposure (gavage) NZW rabbit (pregnant) – vehicle study PMRA#1177984	100, 250 or 500 mg unlabelled azoxystrobin/kg bw/day in 1 mL/kg bw corn oil or 100, 250 mg azoxystrobin/kg bw/day in 2 mL/kg bw corn oil (500 mg/kg bw was excluded based on previous studies) administrated GD 8-20. Concentrations of azoxystrobin-acid in plasma were considerably higher (10–100 fold) than the corresponding values for azoxystrobin. In addition, higher (about 10-fold) concentration of the metabolite was noted in plasma in pregnant vs non-pregnant animals at similar dose-level. There were significant variations among individual animals in systemic exposure to both measured compounds; however, when the group mean values for AUC and Cp max, were compared it was evident that varying the rate of administration of corn oil vehicle from 2 mL/kg bw to l mL/kg bw had no statistically significant effect on systemic exposure to azoxystrobin-acid or azoxystrobin up to 250 mg/kg bw. Rabbits dosed at 2 mL/kg bw showed a greater reduction in body weight than 1 mL/kg bw and only two animals showed signs of recovery. Two animals were terminated prematurely due to excessive weight loss; both were from the group dosed at 2 ml corn oil/kg bw.
Acute Toxicity Studies	
Acute oral toxicity Wistar rat PMRA# 1177962	LD_{50} > 5000 mg/kg bw (♂/♀) No mortality; minimal clinical signs of toxicity Low acute toxicity
Acute oral toxicity (gavage) Wistar rat (♀) PMRA# 2797769	LD_{50} > 2000 mg /kg bw (♀) ≥175 mg/kg bw: ↓ spontaneous activity, piloerection and diarrhea. ≥550 mg/kg bw: eyes half closed and hunched posture 1750 mg/kg bw: slow movements, wasp waist 2000 mg/kg bw: 1 mortality (day 2), prone position, ataxia, piloerection, alopecia Effects were noted 60 min post dosing to 240 min (with the exception of alopecia that was noted on day 6–15) Low acute toxicity
Acute oral toxicity (limit dose) CD-1 mouse PMRA# 2797770	LD_{50} > 5000 mg/kg bw (♂/♀) No mortality or clinical treatment-related signs of toxicity were noted Low acute toxicity

Study type/Animal/PMRA#	Study results
Acute dermal toxicity (limit dose) Wistar rat PMRA# 2796283	LD_{50} > 2000 mg/kg bw (♂/♀) No mortality or clinical signs of toxicity, slight erythema Low acute toxicity
Acute dermal toxicity Wistar rat PMRA# 1177963	LD_{50} > 2000 mg/kg bw (♂/♀) No mortality or clinical signs of toxicity, slight erythema Low acute toxicity
Acute dermal toxicity Wistar rat PMRA# 2797771	LD_{50} > 2000 mg/kg bw (♂) No erythema or oedema was observed. Crust and scratches were observed in 1 of 5 ♂ Low acute toxicity
Acute inhalation toxicity (4hrs, nose only) Wistar rat PMRA# 1177964	LC_{50} = 0.96/0.70 mg/L air (♂/♀) ≥0.24 mg/L: ↑ incidence of clinical signs (hunched posture, piloerection, breathing irregularities) ≥0.48 mg/L: ↑ incidence clinical signs (splayed gait, ↓ splay reflex and instability) Slight acute toxicity
Acute inhalation toxicity (4hrs, head/nose only) Wistar rat PMRA# 2797773	LC_{50} = 1.78 mg/L combined head (♂ and ♀) LC_{50} = 3.15 mg/L (♂) LC_{50} = 1.41 mg/L (♀) ≥0.5 mg/L: laboured respiration (slight to moderate, changing to moderate at higher concentration), noisy respiration (slight), ↓ activity (slight to moderate), prone position and piloerection in the surviving animals. The animals were symptom free from Day 2, ↓ bwg or bw loss (on day 1–3) ≥1 mg/L: sneezing and ↓ activity (slight) in the surviving animals. The animals were symptom free from Day 5 1.46 mg/L: mortality (2/5 ♂ and 3/5 ♀), diffuse dark/red discolouration of the lungs (2 ♂, 3 ♀); dark/red discolouration/foci of the thymus (2 ♀) Preliminary 1.50 mg/L: 1/2 mortality, bw loss (day one, day 1–14: 20 g in 1 ♂), multifocal dark/red discolouration of the lungs, dark/red discolouration/foci of the thymus (♀) Slight acute toxicity
Acute inhalation toxicity Wistar rat PMRA# 2796285	LC_{50} > 0.568 mg/L Slight acute toxicity

Study type/Animal/PMRA#	Study results
Eye Irritation NZW rabbit PMRA# 1177965	MAS 1hr = 4.3 MAS 24 hrs = 0.22 MIS 24 hrs = 2.87 Slight to moderate erythema and slight chemosis Minimally irritating to the eye
Eye Irritation screening (bovine corneal opacity and permeability assay) Cow (bovine) corneas PMRA# 2797774	Mean in vitro irritation score: 0.73 No GHS category Non-irritating in vitro
Eye Irritation NZW rabbit PMRA# 2796286	MIS 1 hrs = 2 MAS 48 hrs = 1.3 minimally irritating to the eye
Eye Irritation NZW rabbit PMRA# 2797775	MIS 1 hr = 2 MAS 1, 24, 28 hr = 2 MAS 1-72 hrs = 1.3 minimally irritating to the eye
Skin irritation NZW rabbit PMRA# 2796287	MAS = 0 MIS = 0 Non-irritating to the skin
Skin irritation NZW rabbit PMRA# 2797772	MAS = 0 MIS = 0 Non-irritating to the skin
Skin Irritation NZW rabbit PMRA# 1177966	MAS 24 hrs = 0.33 MIS 1 hr = 0.67 Very slight erythema and edema Minimally irritating to the skin
In vitro skin irritation (EPISKIN-SMTM) normal human epidermal keratinocytes (NHEK) PMRA# 2797778	The test item showed no irritant effects. The relative mean tissue viability after 15 min of exposure and 42 hrs post-incubation was 97.8% (>50% deemed as non-irritant) no GHS category Not a skin irritant in vitro
Dermal sensitization (Buehler method) Hartley guinea pig PMRA #2797776	Supplemental Negative Limitation: missing positive control
Dermal sensitization	

Study type/Animal/PMRA#	Study results
(Maximization Test) Hartley guinea pig PMRA# 2796288	Negative
Dermal sensitization (LLNA) CBA/CaOlaHsd mouse PMRA# 2797777	Negative
Short-Term Toxicity Studies	
90-day oral toxicity (dietary) C57BL/10JfAP/Alpk mouse PMRA# 1178040	NOAEL = 17/21 mg/kg bw/day (♂/♀) ≥188/227 mg/kg bw/day: ↓ bw (wk 13), ↓ fe (♂/♀); ↑ rel. liver wt (♂); ↓ bwg, liver pathology (↑ eosinophilic staining of periportal hepatocytes and/or microvesicle formation) (♀) ≥ 569/675 mg/kg bw/day: ↓ bwg, liver pathology (eosinophilic staining of periportal hepatocytes and/or microvesicle formation)(♂); ↑ rel. liver wt (♀) 1280/1468 mg/kg bw/day: all animals sacrificed in extremis wk 3 (bw loss at wk 3) (above MTD)
90-day oral toxicity (dietary) Sprague Dawley rat PMRA# 1177956	NOAEL = 20/22 mg/kg bw/day (♂/♀) ≥211/223 mg/kg bw/day: ↓ bw, ↓ fc, distended abdomens, ↓ triglycerides, ↑ phosphate, ↑ rel. liver wt (♂/♀); ↓ food utilization,↑ abs brain wt, ↓ ALP, ↓ aspartate transaminase, ↓ cholesterol, ↓ creatine kinase (♂); ↑ rel. kidney weight, ↑ neutrophil counts, ↓ alanine transaminase (♀) 444/449 mg/kg bw/day: altered hematology (↑ WBC, ↑ lymphocytes, platelets count, ↑ gamma-glutamyl transferase), ↑ rel. kidney wt, bile duct and liver pathology (slight to moderate proliferation of the intrahepatic bile ducts/ and oval cells (♂/♀); cholangitis of the extrahepatic bile duct, inflammatory cell infiltrate of the pancreas, active hepatocellular hyperplasia and a reactive hepatic lymph node), ↓ in renal tubular basophilia,↑ neutrophil and monocyte counts, ↓ alanine transaminase (♂); ↓ food utilization (wk 1–4), ↑ abs brain wt, ↑ cholesterol, ↓ hemoglobin, ↓ aspartate transaminase, ↓ creatine kinase, ↑ calcium (♀)
90-day oral toxicity (capsule) Beagle dog PMRA# 1178050	NOAEL = 50/10 mg/kg bw/day (♂/♀) ≥50 mg/kg bw/day: ↓ bw, ↑ liver wt (♀) 250 mg/kg bw/day: ↓ bwg, clinical signs (salivation, fluid feces, vomiting), ↑ triglycerides, ↑ ALP, ↓ plasma albumin (♂/♀); ↑ thyroid wt, ↑ cholesterol, ↑ GGT (♀)
12-month oral toxicity (capsule) Beagle dog PMRA# 1177957	NOAEL = 25 mg/kg bw/day (♂/♀) ≥25 mg/kg bw/day: altered clinical chemistry (liver: ↑ plasma cholesterol and triglycerides) (non-adverse) (♂); ↑ liver weight (non-adverse) (♀) 200 mg/kg bw/day: ↑ plasma cholesterol, triglycerides and ALP (♂/♀); ↑ liver wt, ↓ in abs brain wt (♂); ↑ GGT clinical signs (diarrhea, salivation) (♀)
21-day dermal toxicity Wistar rat PMRA# 1178041	NOAEL ≥1000 mg/kg bw/day (♂/♀) No evidence of treatment-related toxicity at the highest dose tested (HDT)

Study type/Animal/PMRA#	Study results
Chronic toxicity/Oncogenicity studies	
2-year dietary oncogenicity study (dietary) C57BL/10JfAP/Alpk mouse PMRA# 1177958, 1177967, 1177968	NOAEL = 38/51mg/kg bw/day (♂/♀) 272/363mg/kg bw/day: ↓ bw, ↓ bwg and ↓ fe, ↑ rel liver weight (♂/♀); eye discharge, distended duodenum, ↓ spermatozoa in the epididymis (♂); distended jejunum, ↑ incidence of mononuclear cell infiltration of the thyroid gland (♀) No evidence of tumourigenicity
2-year dietary combined chronic toxicity/oncogenicity (dietary) Sprague Dawley rat PMRA# 1177969, 1177970, 1177971	NOAEL = 18/22 mg/kg bw/day 34/117 mg/kg bw/day: ↓ bw and bwg, ↓ fc and fe, ↓ adrenal gland wt, ↓ kidney wt, ↓ plasma ALT, AST and ALP, and ↓ triglycerides, ↑ plasma glucose and albumin (♂/♀); hunched posture, distended abdomens, ↓ survival, bile duct pathology (in animals that died: distension; cholangitis, thickening of wall, epithelial hyperplasia), liver pathology (marked biliary hyperplasia secondary to blockage in the common bile duct) (♂); ↑ liver wt, ↓ adrenal wt, abs kidney wts (♀) In high dose males surviving until scheduled termination, no abnormalities in the common bile duct were detected. No evidence of tumourigenicity
Developmental/Reproductive toxicity studies	
2-generation reproductive toxicity (dietary) Sprague Dawley rat PMRA# 1177972, 1177973, 1177974	Parental Toxicity NOAEL = 32/34 mg/kg bw/day (♂/♀) 165/175 mg/kg bw/day: ↓ bw (throughout pre-mating F0, F1, gestation F0 and F1, lactation F0 on LD16), ↓ fc, ↑ liver wt (rel: in F0 and F1 ♂/♀, abs F0 ♂)(♂/♀); pathology of liver (↑ in severity of proliferative cholangitis) and bile duct (distention (F0, F1) as epithelial hyperplasia of the intra-duodenal portion, cholangitis and ulceration)(♂) Reproductive Toxicity NOAEL = 165/175 mg/kg bw/day (♂/♀) No effects on reproductive indices, no effects on reproductive organs. Sexual maturation, ovarian follicle counts, estrous cycle length and periodicity, and sperm parameters (motility and morphology) were not examined. Offspring Toxicity NOAEL = 7 mg/kg bw/day *Note: unweaned offspring also had access to treated food ≥34 mg/kg bw/day: ↓ pup bw (F2a: PND 22, 29) 175 mg/kg bw/day: ↓ pup bw (F1a: PND 16-29; F2a PND 11-29), ↑ liver wt in F1 and F2 litters at the end of lactation Low concern for evidence of sensitivity of the young *(Additional details in Toxicology Summary)
Developmental toxicity (gavage in corn oil) Dosed GD 7-16 Wistar rat PMRA# 1177975, 1227047	Maternal Toxicity NOAEL = 25 mg/kg bw/day ≥25 mg/kg bw/day: salivation (from GD 11, non-adverse) ≥100 mg/kg bw/day: ↓ bw, ↓ fc (GD 7-22), salivation (from GD 9, non-adverse), diarrhea (from GD 8), urinary incontinence (from GD 8)

Study type/Animal/PMRA#	Study results
	300 mg/kg bw/day: excessive maternal toxicity (discontinued: mortality, weight loss, clinical signs after 2–5 doses) Developmental Toxicity NOAEL = 100 mg/kg bw/day No treatment-related effects No evidence of sensitivity of the young or treatment-related malformation
Dose range finding Developmental toxicity (gavage in corn oil) Dosed GD 8-20 NZW rabbit PMRA# 1178007	Maternal Toxicity: ≥60 mg/kg bw/day: diarrhea, subdued, mortality/sacrifice in extremis, bw loss (starting GD 8) ≥90 mg/kg bw/day: irregular breathing, stained coat, fewer feces, ↓ fc, changes in stomach (abnormal content and detached mucosa) and cecum 120 mg/kg bw/day: ↑ late intra-uterine death (attributable to one litter, bw loss not recovered until GD 19) Developmental Toxicity: No adverse effect on the number, growth or survival of the foetuses in utero.
Vehicle dose-range finding (gavage corn oil) NZW rabbit (non-pregnant) PMRA# 1178005	Supplemental 200-800 mg/kg bw/day in 1–4 mL corn oil: ↓ bw, ↓ fc, thin, few feces Repeat of high dose, 800 mg/kg bw/day in corn oil: 800 mg/kg bw/day in 4 mL corn oil: severe diarrhea, cold, subdued, hunched, marked bw loss
Vehicle dose-range finding toxicity study (gavage corn oil) NZW rabbit (non-pregnant) PMRA#1177979	Supplemental 600 mg/kg bw/day in 1 mL corn oil/kg bw/day: ↓ bw (transient), ↓ fc (day 1–4) 400 mg/kg bw/day in 2 mL corn oil/kg bw/day: ↓ bw, ↓ fc
Vehicle dose-range finding developmental toxicity study (gavage corn oil) Dosed GD 8-20 NZW Rabbit (pregnant) PMRA# 1177978	Supplemental ≥2 mL/kg bw/day corn oil: not tolerated by the rabbits: diarrhea, ↓ bwg and reduced food consumption, ↓ survival. The scheduled number of daily doses could not be given 3–4 mL/kg bw/day corn oil: mortality, sloughed mucosa, red/black area of stomach, abnormal content of the caecum, accentuated pattern of lobulation of the liver and changes in the external appearance of the kidneys. 5 mL/kg bw/day corn oil: mortality (after 2nd dose)
Vehicle dose-range finding developmental toxicity study (gavage corn oil) NZW rabbit (pregnant) PMRA#1177980	Supplemental In 1 mL corn oil/kg bw: ≥100 mg azoxystrobin/kg bw/day: ↑ incidence of animals with diarrhea and/or with staining in the genital area, ↓ fc (greatest day 8–11 until end, stable day 20, partially recovered day 20-30) ≥250 mg azoxystrobin/kg bw/day: ↓ bw and fc (transient) In 2 ml corn oil/kg bw: ≥100 mg azoxystrobin/kg bw/day: ↓ fc, ↓ bwg ≥250 mg azoxystrobin/kg bw/day: 5/8 animals had negligible fc, all animals sacrificed in extremis

Study type/Animal/PMRA#	Study results
	2 mL corn oil/kg bw control: ↑ incidence of animals with no feces (3 vs 0) or with diarrhea (3 vs 1) vs 1 mL corn oil control, initial bw loss and ↓ fc vs sham control There was no adverse effect of azoxystrobin or the corn oil vehicle on the number, growth or survival of the foetuses in utero.
Developmental toxicity (gavage in corn oil) Dosed GD 7-19 NZW rabbit PMRA#1177985	Maternal Toxicity LOAEL= 50 mg/kg bw/day ≥50 mg/kg bw/day: diarrhea, signs of diarrhea indicated by staining, bw loss ≥150 mg/kg bw/day: transient ↓ fc 500 mg/kg bw/day: ↓ bw (overall), ↓ fc Developmental Toxicity NOAEL = 500 mg/kg bw/day no treatment-related effects No evidence of sensitivity of the young No evidence of treatment-related malformation
Genotoxicity Studies	
Bacterial Reverse Mutation Assay (in vitro) S. typhimurium (TA1535, TA1537, TA98, TA100) E. coli (WP2P, WP2P uvrA) PMRA# 1177977	Negative (+/- metabolic activation) up to 5000 µg/plate
Bacterial Reverse Mutation Assay (in vitro) S. typhimurium (TA 98, TA 100, TA 1535, TA 1537) E.coli WP2 uvrA PMRA# 2797779	Negative (+/- metabolic activation) up to 5000 µg/plate
Bacterial Reverse Mutation Assay (in vitro) S.typhimurium (TA 98, TA 100, TA 102, TA 1535, TA 1537) PMRA# 2796289	Negative (+/- metabolic activation) up to 5000 µg/plate

Study type/Animal/PMRA#	Study results
Unscheduled DNA Synthesis (in vivo) (oral gavage in dried corn oil) Sprague Dawley (♂) rat hepatocytes PMRA# 1178002 MRID 43678149	Negative up to 2000 mg/kg bw Some signs of toxicity were observed at each dose level (500-2000 mg/kg bw) in preliminary study: diarrhea and urinary incontinence. No apparent signs of excessive cytotoxicity were observed in hepatocytes. No induction of UDS based on an evaluation of both the mean net nuclear grain count and percentage of cells in repair. No clinical signs of toxicity observed in the main study.
Mammalian cell gene mutation assay (in vitro) L5178Y mouse lymphoma cells PMRA# 1177988	Positive (+/- metabolic activation) Experiment 1: 8, 15, 30 or 60 µg/mL Experiment 2: 24, 45, 60 or 80 µg/mL Experiment 3: 26, 33, 41, 51, 64 or 80 µg/mL ↑ ss in mutant frequency + S9 (2-3 fold), in 3 experiments ↑ ss in mutant frequency -S9 (mainly at the higher concentrations, about twofold). ss dose-response ±S9. ↑ in the numbers at small mutant colonies which may reflect clastogenic potential Experiment 2: concentrations in the absence of S9 were considered invalid due to a solvent control mutant frequency outside the acceptable range.
Mammalian cell cytogenetics assay (in vitro) human lymphocytes PMRA# 1177999	Positive (+/- metabolic activation) ≥5 µg/mL: ↑ percentage of aberrant cells (excluding cells with only gap-type aberrations) –S9 (72 hrs)(♀) ≥20 µg/mL: ↓ in mitotic activity–S9 (72 hrs); ↑ percentage of aberrant cells (excluding cells with only gap-type aberrations) –S9 (72 hrs)(♂) ≥100 µg/mL: ↑ percentage of aberrant cells (excluding cells with only gap-type aberrations) +S9 (72 hrs)(♂) 200 µg/mL: ↓ in mitotic activity +S9 (72 hrs) (♂/♀); ↓ in mitotic activity, -S9 (96 hrs) , ↑ percentage of aberrant cells (excluding cells with only gap-type aberrations) +S9 (72 hrs)(♀)
Micronucleus Assay (in vivo) (oral, presumed gavage) NMRI mouse PMRA# 2797780	Negative Azoxystrobin did not induce structural and/or numerical chromosomal damage in the immature erythrocytes of the mouse. Main Study (♂ only): 400 mg/kg bw: Clinical signs of toxicity at limit dose included ↓ in spontaneous activity, half-eye closure, hunched position, diarrhea (0.5–4 hrs post dose) 1000 mg/kg bw: Clinical signs of toxicity at limit dose included ↓ in spontaneous activity (0.5–24 hrs post dose), bradykinesia (0.5–4 hrs post dose), half-eye closure (0.5–24 hrs post dose, full eye closure to lesser extent), hunched position (0.5–4 hrs post dose), diarrhea (0.5–4 hrs post dose), constricted abdomen (0.5–2 hrs post dose). After 4 hrs clinical signs of toxicity subsided.

Study type/Animal/PMRA#	Study results
	2000 mg/kg bw (HDT): Clinical toxicity included ↓ of spontaneous activity (0.5–24 hrs post dose), bradykinesia (0.5–4 hrs post dose), piloerection (0.5-4 hrs post dose), half-eye closure (0.5–24 hrs post dose, full eye closure to lesser extent), hunched position (0.5-4hrs post dose), diarrhea (0.5–4 hrs post dose), constricted abdomen (0.5–2 hrs post dose). After 44 hrs no toxic symptoms were observed anymore in mice
Mouse micronucleus test (in vivo)(oral) C57BL/6JfBLlO/Alpk mouse PMRA# 1178003	Negative 5000 mg/kg bw: ↓ % of polychromatic erythrocytes (measured at 48 hrs; 19%, indicating a possible cytotoxic effect on the bone marrow) (♂); Clinical signs included subdued nature, tiptoe gait, piloerection, signs of diarrhoea and urinary incontinence (day 1)(♀)
Micronucleus test (in vivo)(oral) Swiss albino mouse PMRA# 2796290	Negative No treatment-related clinical signs were noted up to 2000 mg/kg bw.
Neurotoxicity Studies	
Preliminary acute neurotoxicity study Sprague Dawley rat PMRA# 2807508	2000 mg kg/bw: urinary incontinence (6-8 hrs post-dose) and diarrhea (1-5 hrs post-dose)(♂/♀); tip toe gait (1–4 hrs post-dose), slightly ↓ bw (♀, day 1–2)
Acute neurotoxicity (gavage in corn oil) Sprague Dawley rats PMRA# 1178061 2807522, 2807507	LOAEL = 200 mg/kg bw/day ≥200 mg/kg bw: transient diarrhea 2 hrs post-dosing (or staining representative of sign of diarrhea) and gastric irritation, tip toe gait (day 1; no clear DR) ≥600 mg/kg bw: ↑ bwg on day 1 (not adverse), inconsistent changes in landing foot splay (♂/♀); ↑ bwg on day 8 (not adverse)(♀) 2000: ↓ bw (marginal on day 8, 15), ↓ hind-limb grip strength (day 15) (♂); ↓ overall motor activity on day 8 and day 15 (secondary to discomfort)(♀) No adverse treatment-related effects were noted forelimb grip strength, or tail flick times (inconsistent, large variation, no clear DR). No treatment-related changes were noted in brain morphometry measurements and brain pathology. No evidence of neurotoxicity
90-day Neurotoxicity (dietary) Wistar derived rat - Alpk:APfSD PMRA# 1178072, 2807509	NOAEL = 39/48 mg/kg bw/day 161/202 mg/kg bw/day: ↓ bw and ↓ bwg, ↓ food utilization (♂/♀); ↓ fc (♂) No evidence of neurotoxicity
Metabolites Studies	
Acute oral toxicity study (up and down procedure) Metabolite V Wistar rat (females only) PMRA# 2807497	LD_{50} >5000 mg/kg bw (♀) Low acute toxicity Clinical signs of toxicity included slightly ruffled fur noted at 0.5 hr post-dosing until day 5/6, hunched posture (2–5 hrs post dosing), slight sedation (2–3 hrs post dosing).

Study type/Animal/PMRA#	Study results
Bacterial Reverse Mutation Assay S. typhimurium strains (TA1535, TA1537, TA98 and TA100) and E.coli strains (WP2 (pKM101) and WP2 uvrA (pKM101)) Metabolite V PMRA# 2807505	Negative ± metabolic activation Tested up to 5000 µg
Special Studies	
QSAR Assessment of Toxicological Properties PMRA# 2796291	Azoxystrobin and an impurity were tested in QSAR models EPIWIN, ACD labs, DEREK NEXUS, TOXTREE, USEPA T.E.S.T, TOXTREE, VEGA, ECOSAR, and DEMETRA None of the structures analysed triggered any alerts in DEREK for carcinogenicity, chromosome damage, genotoxicity or mutagenicity. Eye and skin irritation was not indicated in any of the QSAR models evaluated. TOXTREE and DEREK indicated an alert for skin sensitisation "Michael acceptor" which was triggered for azoxystrobin alone. An equivocal alert for nephrotoxicity was triggered in DEREK for both azoxystrobin and the impurity.

Table 3 Toxicological reference values for use in health risk assessment for azoxystrobin

Exposure scenario	Study	Point of departure and endpoint	CAF[1] or target MOE
ARfD	Developmental toxicity study in rat (gavage)	Maternal NOAEL = 25 mg/kg bw diarrhea and urinary incontinence	100
	ARfD = 0.3 mg/kg bw		
ADI All populations	2-year dietary combined chronic toxicity/oncogenicity[2]	NOAEL = 18 mg/kg bw/day ↓ bw; ↓ survival, and marked bile duct and liver pathology (♂)	100
	ADI = 0.2 mg/kg bw/day		
Short- and intermediate-term dermal	21-day dermal rat toxicity study	NOAEL = 1000 mg/kg bw/day (HDT) No treatment-related effects	100
Short- and intermediate-term inhalation[3]	Co-critical studies: 12-month oral dog toxicity study (capsule) and developmental toxicity study in rat (gavage)	NOAEL= 25 mg/kg bw/day ↑ liver wt, altered clinical chemistry in both sexes and ↓ abs. brain wts (♂) and altered clinical signs including diarrhea (♀) Maternal NOAEL = 25 mg/kg bw ↓ bw, diarrhea and urinary incontinence	100
Long-term dermal[2] and inhalation[3]	2-year dietary combined chronic toxicity/oncogenicity	NOAEL = 18 mg/kg bw/day ↓ bw; ↓ survival, and marked bile duct and liver pathology (♂)	100
Cancer	A cancer risk assessment was not required		

[1] CAF (composite assessment factor) refers to a total of uncertainty and PCPA factors for dietary assessments; MOE refers to a target MOE for occupational and residential assessments

[2] Since an oral NOAEL was selected, a dermal absorption factor of 13% was used in a route-to-route extrapolation

[3] Since an oral NOAEL was selected, an inhalation absorption factor of 100% (default value) was used in route-to-route extrapolation.

Appendix IV Dietary exposure and risk estimates

Table 1 Summary of acute deterministic dietary exposure and risk analyses for azoxystrobin

Population Subgroup	Food only (95th Percentile)		Food and drinking water[1] (95th Percentile)	
	Exposure (mg/kg bw/day)	%ARfD[2]	Exposure (mg/kg bw/day)	%ARfD[2]
General Population	0.043404	14.5	0.062960	21.0
All Infants (<1 year old)	0.063627	21.2	0.119085	39.7
Children 1−2 years old	0.112487	37.5	0.130184	43.4
Children 3−5 years old	0.084469	28.2	0.100627	33.5
Children 6−12 years old	0.048667	16.2	0.063993	21.3
Youth 13−19 years old	0.031368	10.5	0.045799	15.3
Adults 20−49 years old	0.035902	12.0	0.054904	18.3
Adults 50+ years old	0.037943	12.7	0.053426	17.8
Females 13−49 years old	0.037231	12.4	0.056046	18.7

1 Estimated environmental concentrations (EECs) of azoxystrobin in potential drinking water sources (groundwater and surface water) were modelled. The acute EEC used in this estimation is 511 µg/L (groundwater, 90th percentile of daily average concentrations) modeled using 2 applications of 1920 g a.i./ha and 780 g a.i/ha with an interval of 7 days between applications.

2 Acute Reference Dose (ARfD) of 0.3 mg/kg bw

Table 2 Summary of chronic non-cancer and cancer dietary exposure and risk analyses for azoxystrobin

Population subgroup	Food only		Food and drinking water[1]	
	Exposure (mg/kg bw/day)	%ADI[2]	Exposure (mg/kg bw/day)	%ADI[2]
General Population	0.008407	4.2	0.018731	9.4
All Infants (<1 year old)	0.009271	4.6	0.047837	23.9
Children 1−2 years old	0.022851	11.4	0.037050	18.5
Children 3−5 years old	0.018341	9.2	0.029894	14.9
Children 6−12 years old	0.010071	5.0	0.018662	9.3
Youth 13−19 years old	0.006274	3.1	0.013552	6.8
Adults 20−49 years old	0.007300	3.6	0.017557	8.8
Adults 50+ years old	0.007417	3.7	0.017392	8.7
Females 13−49 years old	0.007255	3.6	0.017338	8.7

[1] Estimated environmental concentrations (EECs) of azoxystrobin in potential drinking water sources (groundwater and surface water) were modelled. The chronic EEC used in this estimation is 511 µg/L (groundwater, 90th percentile of 365-day moving average concentrations) modeled using 2 applications of 1920 g a.i./ha and 780 g a.i/ha with an interval of 7 days between applications.

[2] Acceptable daily intake (ADI) of 0.2 mg/kg bw/day.

Appendix V Occupational mixer/loader/applicator exposure and risk assessment

Table 1 Short-/intermediate-term risks for workers mixing/loading and applying azoxystrobin using groundboom equipment

Use[a]			Maximum AR[b] (kg a.i./ha)	ATPD[c] (ha)	Dermal exposure[d] (mg/kg bw/day)	Dermal MOE[e]	Inhalation exposure[f] (mg/kg bw/day)	Inhalation MOE[g]
Crop type	Representative use	Amount handled per day (kg a.i/day						
Liquid formulation Open mix/load liquids (AHETF) and application using groundboom (AHETF) PPE: long sleeved-shirt, long pants, and chemical-resistant gloves								
Large field crop	Safflower	100.8	0.28	360	0.1057	9459	0.0029	8589
Small field crop	Radish	39.0	1.50	26	0.0409	24 449	0.0011	22,200
Berries	Cranberry	22.8	0.25	91	0.0239	41 913	0.0007	38,057
Outdoor ornamentals	Ornamentals, outdoor	8.4	0.30	27.5	0.0088	>100 000	0.0002	>100,00
Turf	Sod farm	57.6	1.92	30	0.0604	16 554	0.0017	15,031
Wettable granules formulation Open mix/load dry flowable (AHETF) and application using groundboom (AHETF) PPE: long sleeved-shirt, long pants, and chemical-resistant gloves								
Large field crops	Potato	54.0	0.15	360	0.0739	13 525	0.0158	1577
Small field crops	Cucurbits	3.9	0.15	26	0.0053	>100 000	0.0011	21,841
Outdoor ornamentals	Ornamentals, outdoor	8.3	0.30	27.5	0.0113	88 524	0.0024	10,325
Turf	Sod farm	36.0	1.20	30	0.0493	20 287	0.0106	2366

AR = application rate; MOE = margin of exposure

[a] The most conservative use scenario for a given crop group based on the highest amount of active ingredient per day (Maximum AR × ATPD)

[b] Maximum AR (kg a.i./ha) as per current product labels

[c] Area treated per day (default PMRA values; cranberry and ornamentals nursery – 2011 Stats Canada)

[d] Dermal exposure (mg/kg bw/day) = dermal unit exposure (mg/kg a.i.) × maximum AR (kg a.i./ha) × ATPD (ha) / body weight of 80 kg

[e] Dermal MOE = NOAEL of 1000 (mg/kg bw/day) / Dermal exposure (mg/kg bw/day); target MOE = 100 (Appendix III)

[f] Inhalation exposure (mg/kg bw/day) = inhalation unit exposure (mg/kg a.i.) × ATPD (ha) × maximum AR (kg a.i./ha) / body weight of 80 kg

[g] Inhalation MOE = NOAEL of 25 (mg/kg/bw/day) / Inhalation exposure (mg/kg bw/day); target MOE = 100 (Appendix III)

Table 2 Short-/intermediate-term risks for workers mixing/loading and applying azoxystrobin using airblast equipment

Use[a]			Maximum AR[b] (kg a.i./ha)	ATPD (ha)[c]	Dermal exposure[d] (mg/kg bw/day)	Dermal MOE[e]	Inhalation exposure[f] (mg/kg bw/day)	Inhalation MOE[g]
Crop type	Representative use	Amount handled per day (kg a.i./day)						
Liquid formulation Open mix/load liquids (AHETF) and application using airblast (AHETF) PPE: long sleeved-shirt, long pants, and chemical-resistant gloves; applicator without chemical-resistant hat								
Outdoor ornamentals	Ornamentals, outdoor	41.25	1.5	27.5	1.9737	507	0.005	4993
Tree nuts	Hazelnuts and filberts	4.50	0.23	20	0.2153	4644	0.0005	45,772
Berries	Blueberry, lowbush	3.00	0.08	40	0.1435	6967	0.0004	68,658
Wettable granules formulation Open mix/load dry flowable (AHETF) and application using airblast (AHETF) PPE: long sleeved-shirt, long pants, and chemical-resistant gloves; applicator without chemical-resistant hat								
Outdoor ornamentals	Ornamentals, outdoor	8.5	0.30	27.5	0.3974	2516	0.0032	7851

AR = application rate; MOE = margin of exposure

[a] The most conservative use scenario for a given crop group based on the highest amount of active ingredient per day (maximum AR × ATPD)

[b] Maximum AR (kg a.i./ha) as per current product labels

[c] ATPD (ha) – area treated per day (default PMRA values)

[d] Dermal exposure (mg/kg bw/day) = dermal unit exposure (mg/kg a.i.) × maximum AR (kg a.i./ha) × ATPD (ha) / body weight of 80 kg

[e] Dermal MOE = NOAEL of 1000 (mg/kg bw/day) / Dermal exposure (mg/kg bw/day); target MOE = 100 (Appendix III)

[f] Inhalation exposure (mg/kg bw/day) = inhalation unit exposure (mg/kg a.i.) × ATPD (ha) × Maximum AR (kg a.i./ha) / body weight of 80 kg

[g] Inhalation MOE = NOAEL of 25 (mg/kg/bw/day) / Inhalation exposure (mg/kg bw/day); target MOE = 100 (Appendix III)

Table 3 Short-/intermediate-term risks for workers mixing/loading and applying azoxystrobin using aerial equipment and via irrigation systems

Application method	Use[a] Crop type	Use[a] Representative use	Use[a] Amount handled per day (kg a.i./day)	Activity	Maximum AR[b] (kg a.i./ha)	ATPD[c] (ha)	Dermal exposure[d] (mg/kg bw/day)	Dermal MOE[e]	Inhalation exposure[f] (mg/kg bw/day)	Inhalation MOE[g]
Aerial	**Liquid formulation** Open mix/load liquids (AHETF) and aerial application (AHETF) PPE: long sleeved-shirt, long pants, and chemical-resistant gloves									
	Large field crops	Canola	100.0	ML	0.25	400	0.0731	13 675	0.0008	31 746
				A			0.0033	>200 000	0.000012	>2 000 000
	Small field crops	Tomato	50.0	ML	0.13	400	0.0366	27 350	0.0004	63 492
				A			0.0017	>500 000	0.000006	>4 000 000
	Berries	Blueberry, lowbush	30.0	ML	0.075	400	0.0219	45 584	0.0002	>100 000
				A			0.0010	>900 000	0.000004	>6 000 000
	Wettable granules formulation Open mix/load dry flowable (AHETF) and aerial application (AHETF) PPE: long sleeved-shirt, long pants, and chemical-resistant gloves									
	Large field crops	Potato	60.0	ML	0.15	400	0.0631	15 847	0.0164	1529
				A			0.0020	>400 000	0.000007	>3 000 000
Chemigation	**Liquid formulation** Open mix/load liquids (AHETF) for application via irrigation systems PPE: long sleeved-shirt, long pants, and chemical-resistant gloves									
	Berries	Cranberry	22.75	ML	0.250	91	0.0166	60 111	0.0002	>100 000

AR = application rate; MOE = margin of exposure; ML = mixer/loader; A = applicator/pilot

[a] The most conservative use scenario for a given crop group based on the highest amount of active ingredient per day (Maximum AR × ATPD)

[b] Maximum AR (kg a.i./ha) as per current product labels

[c] ATPD (ha) – area treated per day (default PMRA values)

[d] Dermal exposure (mg/kg bw/day) = dermal unit exposure (mg/kg a.i.) × maximum AR (kg a.i./ha) × ATPD (ha) / body weight of 80 kg

[e] Dermal MOE = NOAEL of 1000 (mg/kg bw/day) / Dermal exposure (mg/kg bw/day); target MOE = 100 (Appendix III)

[f] Inhalation exposure (mg/kg bw/day) = inhalation unit exposure (mg/kg a.i.) × ATPD (ha) × maximum AR (kg a.i./ha) body weight of 80 kg

[g] Inhalation MOE = NOAEL of 25 (mg/kg/bw/day) / Inhalation exposure (mg/kg bw/day); target MOE = 100 (Appendix III)

Table 4 Short-/intermediate-term risks for workers mixing/loading and applying azoxystrobin to outdoor crops using handheld equipment

Application equipment	Use[a]		Maximum AR[b] (kg a.i./ha)	ATPD[c] (ha)	Dermal exposure[d] (mg/kg bw/day)	Dermal MOE[e]	Inhalation exposure[f] (mg/kg bw/day)	Inhalation MOE[g]
	Representative use	Amount handled per day (kg a.i./day)						
Liquid formulation Open mix/load liquids and application using handheld equipment (PHED: manually pressurized handwand, mechanically pressurized handgun, and backpack sprayer) Open mix/load liquids and application using turf gun (ORETF); PPE: long sleeved-shirt, long pants, and chemical-resistant gloves								
Manually pressurized handwand	outdoor ornamentals	0.23	1.52	0.15	0.0027	>300 000	0.00018	>100 000
	turf	3.84	1.92	2.00	0.0453	22 084	0.00298	8387
Mechanically pressurized handgun	outdoor ornamentals	5.78	1.52	3.80	0.4033	2480	0.01740	1437
Backpack	outdoor ornamentals	0.23	1.52	0.15	0.0155	64 430	0.00018	>100 000
	turf	0.36	1.92	0.19	0.0248	40 269	0.00028	88 284
	spot treatment (cabbage)	0.56	0.28	2.00	0.0381	26 232	0.00043	57 511
Turf gun	turf	3.84	1.92	2.00	0.0377	26 539	0.00019	>100 000
Wettable granules formulation Open mix/load wettable powder and application using manually pressurized handwand (PHED); Open mix/load of dry flowable (AHETF) and application using manually pressurized handgun and backpack (PHED); Open mix/load of wettable granules and application using turf gun (ORETF); PPE: long sleeved-shirt, long pants, and chemical-resistant gloves								
Manually pressurized handwand	outdoor ornamentals	0.05	0.3	0.15	0.0111	90 041	0.00080	31 233
	turf	2.40	1.2	2.0	0.5923	1688	0.04269	586
Mechanically pressurized handgun	outdoor ornamentals	1.14	0.3	3.8	0.0808	12 377	0.00374	6676
Backpack	outdoor ornamentals	0.05	0.3	0.15	0.0031	>300 000	0.00005	>500 000
	turf	0.23	1.2	0.19	0.0158	63 450	0.00024	>100 000
	spot treatment (cucurbits)	0.3	0.15	2.0	0.0207	48 222	0.00031	79 460
Turf gun	turf	2.4	1.2	2.0	0.0387	25 840	0.00143	17 434

AR = application rate; MOE = margin of exposure

[a] The most conservative use scenario for a given crop group based on the highest amount of active ingredient per day (Maximum AR × ATPD)
[b] Maximum AR (kg a.i./ha) as per current product labels
[c] ATPD (ha) – area treated per day (based on default ATPD values for handheld equipment and the minimum spray volume as per current product labels)
[d] Dermal exposure (mg/kg bw/day) = dermal unit exposure (mg/kg a.i.) × maximum AR (kg a.i./ha) × ATPD (ha) / body weight of 80 kg
[e] Dermal MOE = NOAEL of 1000 (mg/kg bw/day) / Dermal exposure (mg/kg bw/day); target MOE = 100 (Appendix III)
[f] Inhalation exposure (mg/kg bw/day) = inhalation unit exposure (mg/kg a.i.) × ATPD (ha) × maximum AR (kg a.i./ha) / body weight of 80 kg
[g] Inhalation MOE = NOAEL of 25 (mg/kg/bw/day) / Inhalation exposure (mg/kg bw/day); target MOE = 100 (Appendix III)

Table 5 Long-term risks to workers mixing/loading and applying azoxystrobin to greenhouse ornamentals using handheld equipment

Application equipment	Use[a]		Maximum AR[b] (kg/ha)	ATPD[c] (ha/day)	Dermal Exposure[d] (mg/kg bw/day)	Dermal MOE[e]	Inhalation Exposure[f] (mg/kg bw/day)	Inhalation MOE[g]
	Representative use	Amount handled per day (kg a.i./day)						
Liquid formulation Open mix/load liquids and application using handheld equipment (PHED: manually pressurized handwand, mechanically pressurized handgun, and backpack sprayer) PPE: long sleeved-shirt, long pants, and chemical-resistant gloves;								
Manually pressurized handwand	greenhouse ornamentals	0.05	1.52	0.15	0.0003	51 499	0.00018	>100 000
Mechanically pressurized handgun	greenhouse ornamentals	1.14	1.522	3.80	0.0524	343	0.01740	1034
Backpack sprayer	greenhouse ornamentals	0.05	1.52	0.15	0.002	8921	0.00018	>100 000
Wettable granules formulation Open mix/load wettable powder and application using manually pressurized handwand (PHED) Open mix/load of dry flowable (AHETF) and application using manually pressurized handgun and backpack (PHED) PPE: long sleeved-shirt, long pants, and chemical-resistant gloves								
Manually pressurized handwand	greenhouse ornamentals	0.05	0.30	0.15	0.0014	12 467	0.00080	22 488
Mechanically pressurized handgun	greenhouse ornamentals	1.14	0.30	3.80	0.0105	1714	0.00374	4807
Backpack sprayer	greenhouse ornamentals	0.05	0.30	0.15	0.0004	44 513	0.00005	>300 000

AR = application rate; MOE = margin of exposure
[a] The most conservative use scenario based on the highest amount of active ingredient per day (Maximum AR × ATPD)

[b] Maximum AR (kg a.i./ha) as per current product labels
[c] ATPD (ha) – area treated per day (based on default ATPD values for handheld equipment and the minimum spray volume as per current product labels)
[d] Dermal exposure (mg/kg bw/day) = dermal unit exposure (mg/kg a.i.) × ATPD (ha) × maximum AR (kg a.i./ha) × dermal absorption factor (13%) / body weight of 80 kg
[e] Dermal MOE = NOAEL of 18 (mg/kg/bw/day) / Dermal exposure (mg/kg bw/day); target MOE = 100 (Appendix III)
[f] Inhalation exposure (mg/kg bw/day) = inhalation unit exposure (mg/kg a.i.) × ATPD (ha) × maximum AR (kg a.i./ha) / body weight of 80 kg
[g] Inhalation MOE = NOAEL of 18 (mg/kg/bw day) / Inhalation exposure (mg/kg bw/day); target MOE = 100 (Appendix III)

Table 6 Short-/intermediate-term risks to workers mixing/loading and applying azoxystrobin to postharvest potatoes using overhead sprayer

Scenario	PHED unit exposure (µg /kg a.i. handled)	Amount handled/day[a] (kg a.i/day)	Daily dose (µg/kg bw/day)	MOE
Dermal Exposure[b, c]				
Mixer/loader/applicator	943.37	6.8	80.19	12 470
Inhalation Exposure[d, e]				
Mixer/loader/applicator	45.2	6.8	3.842	6507

[a] The maximum amount handled per day is 6.8 kg a.i./day. Based on the proposed application rate of 0.005 g a.i./kg potatoes, the amount of active ingredient handled per day is 6.8 kg a.i./day (0.005 g a.i. × 1,360,000 kg potatoes).
[b] Dermal daily dose (µg a.i./kg bw/day) = (dermal unit exposure value (µg/kg a.i.) × amount handled/day (kg a.i./day)) / body weight of 80 kg.
[c] Dermal MOE = dermal NOAEL of 1000 (mg/kg/bw/day) / (dermal daily dose (µg a.i./kg bw/day) × conversion factor of 0.001 (mg/µg)); target MOE = 100 (Appendix III).
[d] Inhalation daily dose (µg a.i./kg bw/day) = (inhalation unit exposure value (µg/kg a.i.) × amount handled/day (kg a.i./day)) / body weight of 80 kg.
[e] Inhalation MOE = inhalation NOAEL of 25 (mg/kg/bw day) / (inhalation daily dose (µg a.i./kg bw/day) × conversion factor of 0.001 (mg/µg)); target MOE = 100 (Appendix III).

Table 7 Short- to intermediate-term commercial seed treatment exposure and risk assessment

Crop	Formulation[a]	Activity[b]	Application rate (g a.i./ kg seed)[c]	Throughput (kg seed/day)[d]	Dermal exposure (mg/kg bw/day)[e]	Inhalation exposure (mg/kg bw/day)[e]	MOE	
							Dermal[f]	Inhalation[g]
PPE: Coveralls over Single Layer + CR gloves; Closed mixing/loading (Kroski, 2010)								
Canola, Soybean, Dry Beans	Liquid	Treating/Application	0.2	260 000 [h]	0.0348	7.28 E-4	29 000	34 000
		Bagging, Sewing, Stacking, Forklift Operation			0.0048	9.75E-4	210 000	26 000
		Cleaning		-	0.0141	0.0032	71 000	7900
PPE: Single Layer + CR gloves[i]; Closed mixing/loading (Krolski, 2010)								
Corn	Liquid	Treating/Application	0.01	125 000	0.0040	5.81E-5	250 000	430 000
		Bagging, Sewing, Stacking, Forklift Operation			0.0037	2.92E-4	270 000	86 000
		Cleaning		-	0.0016	3.01E-4	630 000	83 000

MOE = margin of exposure; NOAEL = No observed adverse effects level; PPE = personal protection equipment; CR = chemical-resistant; BW = body weight
Single Layer = long sleeved shirt, long pants
[a] Liquid formulation includes suspensions.
[b] Activities are based on what was monitored in the surrogate exposure study. Cleaning activities were normalized to the application rate rather than the amount handled.
[c] Maximum application rates were used in the assessment.
[d] Standard commercial throughput data was used for all crops.
[e] Dermal/Inhalation Exposure (mg/kg bw/day) = Unit Exposure (µg/kg ai) × Application Rate (g a.i./kg seed) × Throughput (kg seed/day) × Conversion factors/BW (80 kg)
[f] MOE = NOAEL/Exposure. Based on a NOAEL of 1000 mg/kg bw/day from a 21-day rat dermal toxicity study and a target MOE of 100 (Appendix III).
[g] MOE = NOAEL/Exposure. Based on a NOAEL of 25 mg/kg bw/day from a developmental rat toxicity study and a 1-year dog study and a target MOE of 100 (Appendix III).
[h] Based on maximum throughput for dry beans as it addresses all other seed types.
[i] CR gloves not required for bagger, sewer, stacker, and forklift operator activities.

Table 8 Short- to intermediate-term on-farm seed treatment and planting exposure and risk assessment

Crop	Formulation[a]	Activity	Application rate (g a.i./ kg seed)[b]	Throughput (kg seed/day)[c]	Dermal exposure (mg/kg bw/day)[d]	Inhalation exposure (mg/kg bw/day)[d]	MOE	
							Dermal[e]	Inhalation[f]
PPE: Single Layer + CR gloves; Open mixing/loading, Closed cab planting (Krolski, 2006)								
Dry Beans	Liquid	All Tasks[g]	0.01	8640	2.75E-4	1.41E-5	3 600 000	1 800 000

MOE = margin of exposure; PPE = personal protection equipment; NOAEL = no observed adverse effect level; CR = chemical-resistant; BW = body weight
Single Layer = long sleeved shirt, long pants
[a] Liquid formulation includes suspensions.
[b] Maximum application rates were used in the assessment.
[c] Farm throughput input is an upper bound estimate calculated from the area planted per day and maximum seeding rate.
[d] Dermal/Inhalation Exposure (mg/kg bw/day) = Unit Exposure (µg/kg ai) × Application Rate (g a.i./kg seed) × Throughput (kg seed/day)/BW (80 kg)
[e] MOE = NOAEL/Exposure. Based on a NOAEL of 1000 mg/kg bw/day from a 21-day rat dermal toxicity study and a target MOE of 100 (Appendix III).
[f] MOE = NOAEL/Exposure. Based on a NOAEL of 25 mg/kg bw/day from a developmental rat toxicity study and a 1-year dog study and a target MOE of 100 (Appendix III).
[g] All tasks include treating, loading, and planting.

Appendix VI Occupational postapplication exposure and risk assessment

Table 1 Agricultural uses – Short-intermediate-term risks to workers conducting postapplication activities

Crop	Use directions[a]			Peak DFR[b] (µg/cm^2)	Activity	TC[c] (cm^2/hr)	Dermal exposure[d] (mg/kg bw/day)	Day 0 MOE[e]
	Maximum AR (g a.i./ha)	No. of applications	Minimum RTI (days)					
Asparagus, fern	281	3	7	1.1992	Irrigation, handset	1750	0.2099	4765
Barley and wheat	75	2	21	0.2080	Scouting	1100	0.0229	32 798
Beet, sugar	200	3	7	0.8535	Harvesting, hand	1100	0.0939	10 651
Blueberry, highbush	75	4	7	0.3406	Irrigation, handset	1750	0.0596	16 777
Blueberry, lowbush (sprout year only)	75	3	7	0.3201	Irrigation, handset	1750	0.0560	17 853
Cabbage	280	3	7	1.1949	Weeding, hand	4400	0.5258	1902
Canola	250	2	N/A	0.6250	Scouting	1100	0.0688	14 545
Caraway Coriander (plants grown for seeds only) Cumin	281	1	N/A	0.7025	Irrigation, handset	1750	0.1229	8134
Carrot	200	3	7	0.8535	Irrigation, handset	1750	0.1494	6695
Celery, parsley	280	3	7	1.1949	Irrigation, handset	1750	0.2091	4782
CG20A, rapeseeds (including lunaria, mustard seed)	124	1	N/A	0.3100	Scouting	1100	0.0341	29 326
CG3-07: Bulb vegetables	200	4	7	0.9082	Weeding, hand	4400	0.3996	2502
CG5: Brassica (cole) Leafy vegetables	200	4	10	0.7563	Irrigation, handset	1750	0.1324	7556
CG6A and B: Edible-podded legume vegetables	125	2	14	0.3840	Irrigation, handset	1750	0.0672	14 881
CG6C: Dried shelled peas and beans	125	2	10	0.4215	Irrigation, handset	1750	0.0738	13 557
CG8-09: Fruiting vegetables, incl. eggplant, peppers, tomato	125	3	7	0.5335	Irrigation, handset	1750	0.0934	10 711
CG9: Cucurbits	200	4	7	0.9082	Irrigation, handset	1750	0.1589	6292
Corn (field, sweet, seed)	113	2	7	0.4176	Harvesting, hand	8800	0.3675	2721
Cranberries	250	3	7	1.0669	Harvesting, scouting	1100	0.1174	8521

Crop	Use directions[a]			Peak DFR[b] (μg/cm²)	Activity	TC[c] (cm²/hr)	Dermal exposure[d] (mg/kg bw/day)	Day 0 MOE[e]
	Maximum AR (g a.i./ha)	No. of applications	Minimum RTI (days)					
Field pea	125	2	14	0.3840	Irrigation, handset	1750	0.0672	14 881
Ginseng	280	2	30	0.7297	Irrigation, handset	1751	0.1278	7827
Hazelnuts and filberts	225	4	7	1.0218	Scouting	580	0.0593	16 874
Lentils	112	2	14	0.3441	Irrigation, handset	1750	0.0602	16 606
Mint (peppermint; spearmint; susceptible mint hybrids)	75	2	14	0.2304	Irrigation, handset	1750	0.0403	24 802
Oat, rye, and triticale	75	1	N/A	0.1875	Scouting	1100	0.0206	32 798
Potato	200	3	7	0.8535	Irrigation, handset	1750	0.1494	6695
Potato, sweet	200	3	7	0.8535	Irrigation, handset	1750	0.1494	6695
Safflower	280	1	N/A	0.7000	Scouting	1100	0.0770	12 987
Soybean	125	2	7	0.4620	Irrigation, handset	1100	0.0508	19 677
Spinach	281	2	7	1.0385	Harvesting, hand	1750	0.1817	5502
Strawberry	275	1	N/A	0.6875	Irrigation, handset	1100	0.0756	13 223
Tobacco	217	3	7	0.9261	Harvesting, hand	1750	0.1621	6170

AR = application rate; RTI = re-treatment interval; DFR = dislodgeable foliar residue; TC = transferable residues; MOE = margin of exposure

[a] Use directions as per current product labels

[b] Peak DFR (μg/cm²) was calculated assuming a 25% residue deposition following the application and 10% dissipation per day for outdoor crops

[c] The highest TC value for a given crop (ARETF, 2015) was used.

[d] Dermal exposure (mg/kg bw/day) = Peak DFR (μg/cm²) × conversion factor of 0.001 (mg/μg) × TC (cm²/hr) × 8 hours / body weight of 80 kg

[e] Dermal MOE = NOAEL of 1000 (mg/kg bw/day) / Dermal exposure (mg/kg bw/day); target MOE = 100 (Appendix III)

Table 2 Turf and outdoor ornamentals - Short-intermediate-term risks to workers conducting postapplication activities

Crop	Peak DFR/TTR[a] (μg/cm²)	Activity	TC[b] (cm²/hr)	Dermal exposure[b] (mg/kg bw/day)	Day 0 MOE[d]
Ornamentals, except cut flowers	1.1087	Irrigation, handset	1750	0.1940	5154
Ornamentals, outdoor grown for cut flowers	1.1087	Harvesting, hand; pruning, hand	4000	0.4435	2255
Golf course	0.091	Transplanting/Planting	6700	0.0608	16 438
Sod farm	0.091	Harvesting, Slab Transplanting/Planting	6700	0.0608	16 438

DFR = dislodgeable foliar residue; TTR = turf transferable residues; TC = transfer coefficient; MOE = margin of exposure

[a] Peak DFR (μg/cm²) – calculated using the 25% residue deposition following 2 applications at 304 g a.i./ha, RTI 7 days and 10% dissipation per day for outdoor ornamentals

Peak TTR (μg/cm²) – calculated assuming 1% residue deposition following 4 applications at 600 g a.i./ha, RTI 10 days and 10% dissipation

[b] TC (cm^2/hr) - highest TC value for a given crop (ARETF, 2015)
[c] Dermal exposure (mg/kg bw/day) = Peak DFR (µg/cm^2) × conversion factor of 0.001 (mg/µg) × TC (cm^2/hr) × 8 hours (all activities, except hand harvesting of ornamentals grown for cut flowers = 5 hours) / body weight of 80 kg
[d] Dermal MOE = NOAEL of 1000 (mg/kg bw/day) / Dermal exposure (mg/kg bw/day); target MOE = 100 (Appendix III)

Table 3 Long-term risks to postapplication greenhouse workers

Crop	DFR[a] (□g/cm^2)	Activity	TC[b] (cm^2/hr)	Dermal exposure[c] (mg/kg bw/day)	Dermal MOE[d]
Ornamentals, except cut flowers	1.4058	All activities	230	0.0042	4282
Ornamentals, grown for cut flowers Ornamentals, greenhouse grown for cut flowers	1.4058	Harvesting, hand	4000	0.0457	394
		Pruning, hand	4000	0.0731	246
		Weeding, hand; pinching; plant support/staking; scouting	230	0.0042	7282

DFR = dislodgeable foliar residue; TC = transfer coefficient; MOE = margin of exposure
[a] Peak DFR (□g/cm^2) – DFR = peak (day 0) dislodgeable foliar residues calculated using the 25% residue deposition following the 2 applications at 304 g a.i./ha, RTI 7 days, and 2.3% dissipation per day for greenhouse ornamentals
[b] TC (cm^2/hr) for greenhouse ornamentals (ARETF, 2015)
[c] Dermal exposure (mg/kg bw/day) = (Peak DFR (µg/$cm^{2)}$) × conversion factor of 0.001 (mg/µg) × TC (cm^2/hr) × 8 hours (all activities, except hand harvesting of cut flowers = 5 hours) × 13% dermal absorption / body weight of 80 kg
[d] Dermal MOE = NOAEL of 18 (mg/kg bw/day) / Dermal exposure (mg/kg bw/day); target MOE = 100 (Appendix III)

Table 4 Postharvest potatoes – Short-intermediate-term risks to workers conducting postapplication activities

Scenario	Amount of a.i. per potato (µg)[a]	Surface area (cm^2)[b]	Surface residue (µg/cm^2)[c]	Transfer coefficient (cm^2/hr)	Dermal exposure (mg/kg bw/day)[d]	Dermal MOE[e]
Postharvest handling of treated potatoes	1136	156.24	7.271	400	0.29084	3438

[a] Amount of azoxystrobin on potatoes using MRL = residue on potatoes (8.0 □g/g) × weight (142 g)
[b] Surface area (cylinder) = 2□r^2 +□□□rh = (2 × 3.14 × $(5.7/2)^2$) + (2 × 3.14 × (5.7/2) × 8.9) =210.41 cm^2
Surface area (sphere) = 4□r^2 = (4 × 3.14 × $(5.7/2)^2$) = 102.07 cm^2
Average surface area = (210.41 cm^2 + 102.07 cm^2) / 2 = 156.24 cm^2
[c] Surface Residue = Amount of AZY on potato/surface area
[d] Dermal exposure (mg/kg bw/day) = (transfer coefficient (cm^2/hr) × surface residue (□g/ cm^2) × conversion factor of 0.001 (mg/µg) × 8 hours per day) / body weight of 80 kg
[e] MOE = dermal NOAEL of 1000 mg/kg bw/day / Dermal Exposure (mg/kg bw/day); target MOE = 100 (Appendix III)

Table 5 Planting exposure and risk assessment for commercially treated and bagged seed[a]

Crop[b]	Formulation	Application rate (g a.i./ kg seed)[c]	Planting rate (kg seed/day)[d]	Dermal exposure (mg/kg bw/day)[e]	Inhalation exposure (mg/kg bw/day)[e]	MOE	
						Dermal[f]	Inhalation[g]
PPE: Single Layer + CR gloves; Open loading, Closed cab planter (Zeitz, 2007) [h]							
Corn	Liquid	0.01	3150	6.33E-4	3.19E-5	1 600 000	790 000
Vegetables (cucurbit, fruiting, leafy, brassica leafy, bulb, root)		0.05	32 000[i]	3.21E-2	1.62E-3	31 000	15 000
PPE: Single Layer + CR gloves; Open loading, Closed cab planter (Dean, 1990)[j]							
Sunflower	Liquid	0.245	1010	1.31E-3	3.43E-6	760 000	7 300 000
Soybean		0.02028	10 900	1.17E-3	3.07E-6	850 000	8 200 000
Dry Bean		0.01	8300	4.40E-4	1.15E-6	2 300 000	220 00 000
Canola		0.2	800	8.48E-4	2.22E-6	1 200 000	11 000 000

PPE = personal protective equipment; CR = chemical-resistant; MOE = margin of exposure; BW = body weight
Single Layer = long sleeved shirt, long pants

[a] Planting on-farm treated seed was covered in the on-farm exposure studies. Planting commercial bulk seed is considered to be covered by on-farm treating and planting of seed as there is no additional exposure from loading seed from bags.

[b] Crops were designated into categories for assessment purposes as specific planting information were not available for all crops. Crop seed categories are based on similar use patterns such as comparable rates of application and amount of seed handled or planted per day. The highest values among the group were selected for use in the assessment. Refer to Section 1.0 for a listing of crops in each category and Appendix B for more information.

[c] Maximum application rates were used in the assessment.

[d] Based on maximum seeding rates and area planted per day.

[e] Dermal/Inhalation Exposure (mg/kg bw/day) = (Unit exposure (µg/kg a.i.) × Application Rate (g a.i./kg seed) × Planting rate (kg seed/day)/BW (80 kg)

[f] MOE = NOAEL/Exposure. Based on a NOAEL of 1000 mg/kg bw/day from a 21-day rat dermal toxicity study and a target MOE of 100 (Appendix III).

[g] MOE = NOAEL/Exposure. Based on a NOAEL of 25 mg/kg bw/day from a developmental rat toxicity study and a 1-year dog study and a target MOE of 100 (Appendix III).

[h] Although the Zeitz (2007) study was conducted using a closed cab planter, this mitigation has been waived since the calculated MOEs well exceeded the target MOE of 100 which is sufficient to address the protection that would be provided by using a closed cab.

[i] Based on the planting rate (kg seed/ha) and farm size planted per day of 32 ha from garlic.

[j] Although the Dean (1990) study was conducted using a closed cab planter, this mitigation has been waived since the calculated MOEs well exceeded the target MOE of 100 which is sufficient to address the protection that would be provided by using a closed cab.

Appendix VII Residential postapplication exposure and risk

Table 1 Golfer exposure and risk assessment

Lifestage	Peak TTR ($\mu g/cm^2$)[1]	Transfer coefficient (cm^2/hr)[2]	Dermal exposure (mg/kg bw/day)[3]	MOE[4, 5]
Adult	0.0908	5300	0.0241	41 494
Youth (11 < 16 years old)		4400	0.0280	35 714
Child (6 < 11 years old)		2900	0.0329	30 395

[1] Calculated using the default 1% turf transferable residue on the day of application and 10% dissipation per day.
[2] Transfer coefficients obtained from the USEPA Residential SOP (October 2012)
[3] Dermal Exposure (mg/kg bw/day) = Peak TTR [$\mu g/cm^2$] × TC [cm^2/hr] × 4 hours × conversion factor of 0.001 (mg/µg) / body weight (kg); body weights taken from Revised Body Weight Values for Exposure Assessments Memo (December 2012); Adults = 80 kg; Youth = 57 kg; Child = 32 kg
[4] MOE = NOAEL of 1000 (mg/kg bw/day) / dermal exposure (mg/kg bw/day); target MOE = 100 (Appendix III)
[5] As target MOE are met on day 0, re-entry is permitted once sprays have dried.

Appendix VIII Environmental assessment

1 Water modelling

Table 1.1 Major fate inputs for water modelling

Fate parameter	Ecological water (azoxystrobin)	Drinking water (azoxystrobin + Compound 2 + Compound 9)
Hydrolysis half-life at pH 7 and 25°C (days)	Stable for parent	Stable for the combined residue
Photolysis half-life in water (days)	12.6 for parent	15.5 for combined residue
Adsorption K_d or K_{oc} (mL/g)	3.88 for parent (20th percentile of 8 K_d values for the parent)	0.85 for the combined residue (20th percentile of 6 K_d values for Compound 2)
Aerobic soil biotransformation half-life at 20°C (days)	145 (90% confidence bound on mean of 3 half-lives for the parent)	358 (90% confidence bound on mean of 3 half-lives for the combined residues)
Aerobic aquatic biotransformation half-life at 20°C (days)	512 (longer of two half-lives for the parent)	535 (longer of two half-lives for the combined residue)
Anaerobic aquatic biotransformation half-life at 25°C (days)	Assumed stable (no acceptable study)	Assumed stable (no acceptable study)

Table 1.2 EECs for the drinking water risk assessment (in µg/L), based on the crop use pattern for turf

Use pattern	Groundwater (µg a.i./L)		Surface water (µg a.i./L)	
	Daily[1]	Yearly[2]	Daily[3]	Yearly[4]
1920 + 780 g a.i./ha @ 7-d	511	511	149	34

1 90th percentile of daily average concentrations
2 90th percentile of 365-day moving average concentrations
3 90th percentile of the peak concentrations from each year
4 90th percentile of yearly average concentrations

Table 1.3 EECs for the ecological risk assessment (in µg/L), based on the crop use patterns and using general crop scenarios

Use pattern	Water depth	Water column						Pore water	
		Peak	24-hour	96-hour	21-day	60-day	90-day	Peak	21-day
Canola 2 × 0.25 kg a.i./ha, 7-day interval	80 cm	10.5	10.4	10.1	8.69	7.26	6.34	3.74	3.73
	15 cm	43.1	40.7	35.4	20.1	9.19	9.19	-	-
Potato 3 × 0.2 kg a.i./ha, 7-day interval	80 cm	25.5	25.3	24.7	22.2	19.5	19.4	14.2	14.3
	15 cm	99.7	9.39	81.4	47.4	28.2	23.5	-	-
Pumpkin 4 × 0.2 kg a.i./ha, 7-day interval	80 cm	22.5	22.3	21.7	20.9	19.0	18.8	13.8	13.7
	15 cm	77.5	73.1	62.1	40.4	30.1	27.5	-	-

Use pattern	Water depth	Water column						Pore water	
		Peak	24-hour	96-hour	21-day	60-day	90-day	Peak	21-day
Turf (no snow mould) (4 × 0.6) + 0.3 kg a.i./ha, 10-day interval	80 cm	33.8	33.5	32.5	30.1	28.5	24.1	17.8	17.7
	15 cm	140	132	116	65.7	46.0	38.2	-	-
Turf (snow mould) 0.6 + 1.92 kg a.i./ha, 45-day interval	80 cm	39.2	38.8	37.7	33.2	32.1	26.5	18.7	18.6
	15 cm	152	143	122	74.5	51.5	41.0	-	-

Table 1.4 Cranberry bog level 1 modeling EECs and RQ calculated with acute azoxystrobin endpoint for *Navicula pelliculosa* EbC50/2 = 0.007 mg a.i./L

No	Scenario short description	Floodwater EEC (µg a.i./L)	Floodwater RQ	Receiving water EEC (µg a.i./L)	Receiving water RQ
1	10 fields; 50% transfer from water to soil	517	**74**	52	7
2	10 fields; 25% transfer from water to soil	258	**37**	26	4
3	5 fields; 50% transfer from water to soil	270	**39**	27	4
4	5 fields; 25% transfer from water to soil	135	**19**	13	2

Note: The representative half-lives at 20°C were adjusted daily to Vancouver mean temperatures, ranging between 4.1 and 18°C. The beginning of wet-harvest (flooding) was set to 21 September, with an interval of 5 days between fields. Treatment data was set 50 days prior to harvest, as per current label requirements. The floodwater depth was modelled at 0.6 m. The reported EECs and RQs were calculated two weeks after the beginning of the last harvest.
Bolded values indicate an exceedeance of the level of concern (LOC).

2 Environmental fate data used in the risk assessment

Table 2.1 Physical and chemical properties of the active ingredient relevant to the environment

Parameter	Value	Interpretation
Solubility in water	6.0 mg a.i./L at 20°C* pH 5.2 – 6.7 mg/L at 20°C** pH 7.0 – 6.7 mg/L at 20°C** pH 9.2 – 5.9 mg/L at 20°C**	Low solubility
Vapour pressure	1.1×10^{-10} Pa at 20°C, by extrapolation*, **	Relatively non-volatile under field conditions
Henry's law constant, K 1/H	7.4×10^{-9} Pa m^3/mol** 7.3×10^{-14} atm m^3/mol*,*** 3.29×10^{11}	Low potential to volatilize from water or moist soil
Octanol/water partition coefficient (K_{ow})	Log 2.5 at 20°C (Log K_{ow} = 0.39)* Log K_{ow} = 2.5**	Azoxystrobin is not expected to bioaccumulate. Therefore, bioaccumulation studies were not triggered for any jurisdiction. In PMRA# 1178010 the log Pow is reported by the applicant to be 2.5 at 20°C which appears to have been

Parameter	Value	Interpretation
		misreported as the K_{ow} and then the log was taken again. For this review, the log K_{ow} of 2.5 was used
Dissociation constant	-	Not expected to dissociate
Ultraviolet/visible spectrum	λmax (in methanol): 211 nm*	Low potential for UV phototransformation under normal environmental conditions. Visible spectrum not submitted.
Solubility in organic solvents	Solubility at 20°C Hexane – 0.057 g/L Octan-1-ol – 1.4 g/L Methanol – 20 g/L Toluene – 55 g/L Acetone 86 g/L Ethyl acetate – 130 g/L Acetonitrile – 340 g/L Dichloromethane – 400 g/L	-

*PMRA# 1650355
**PMRA# 3424313
***PMRA# 3424316

Table 2.2 Environmental fate data for azoxystrobin used in the environmental risk assessment

DACO	Study PMRA# compound	Review PMRA#	Endpoint	Additional information
8.2.3.2 Hydrolysis	1178000 Azoxystrobin	1650355 (page 7) Recalculated in 2908007	pH 5 –stable pH 7 – stable pH 9 – stable	N/A
8.2.3.3.1 Soil Photo-transformation	1178001 Azoxystrobin	1650355 (page 9) Recalculated in 2908007	Hyde Farm sandy loam DT_{50} 10.79 days (DFOP) DT_{90} 90.35 days Tr 34.32 days	The lack of first order kinetics suggests multiple means of dissipation are occurring during the study.
8.2.3.3.2 Water Photo-transformation	1178019 Azoxystrobin	1650355 (page 15) Recalculated in 2908007	Buffer, pH 7 DT_{50} 10.48 days (DFOP) DT_{90} 46.55 days Tr 15.54 days	The lack of SFO kinetics for the natural water suggests other routes of dissipation are potentially occurring in the natural water study. There is no discussion of the natural water being sterilized prior to the study. As the pH 5 buffer also does not follow SFO, the additional routes of transformation are not clear in the natural water.
	1178047 Azoxystrobin	1650355 (page 18) Recalculated in 2908007	Natural water, pH 7.6 DT_{50} 2.0 days (DFOP) DT_{90} 13.91 days Tr 5.3 days Ultrapure water DT_{50} 14.3 days (SFO) DT_{90} 47.34 days	

DACO	Study PMRA# compound	Review PMRA#	Endpoint	Additional information
8.2.3.4.2 Aerobic Soil Bio-Transformation*	1178008; 2807512; 2807513 Azoxystrobin	1650355 (page 22) Recalculated in 2908007	Hyde Farm sandy loam DT_{50} 58.7 days (IORE) DT_{90} 406 days Tr 122 days 18 Acres sandy clay loam DT_{50} 85.1 days (IORE) DT_{90} 317 days Tr 95.5 days Visalia sandy loam DT_{50} 142 days (SFO) DT_{90} 471 days	These three studies were also included in the EFSA review. They were only assessed and used once.
	NA	PMRA# 3424313 EFSA review 2010 (page 35)	18 Acres sandy clay loam DT_{50} 56.4 days (SFO) DT_{90} 187 days East Anglia sand DT_{50} 66.9 days (SFO) DT_{90} 222 Wisborough Green silty clay loam DT_{50} 94.1 days (SFO) DT_{90} 313.0 days Derbyshire clay loam DT_{50} 118.4 days (SFO) DT_{90} 393 days Holland sandy loam DT_{50} 153.4 days (SFO) DT_{90} 510 days Lincolnshire sandy loam DT_{50} 248 days (SFO) DT_{90} 824 days	The reported 18 Acres study is a separate study from the 18 Acres study submitted to the PMRA. Lincolnshire was not used by EFSA as the endpoint is extrapolated beyond the study length. The value was used by PMRA.
	90% upper confidence bound on the mean for parent only (n = 9)		148 days	Parent only. For fate parameters used for water modelling, please see the water modelling input table (Appendix VIII, Table 1.1).
8.2.3.4.4 Anaerobic Soil Bio-transformation	1178008; 2807512; 2807513 Azoxystrobin	1650355 (page 22) Recalculated in 2908007	Hyde Farm sandy loam DT_{50} 41.61 days (IORE) DT_{90} 217.80 days Tr 65.46 days	The anaerobic portion was only conducted on Hyde Farm and 18 Acres. Mass balance for 18 Acres averaged 38% AR and was found unacceptable.
8.2.3.5.4 Aerobic Aquatic Bio-transformation	1178009 Azoxystrobin	1650355 (page 29) Recalculated in 2908007	Old Basing Whole system DT_{50} 236 days (SFO) DT_{90} 785 days Water only DT_{50} 5.91 days (IORE) DT_{90} 78.4 days Tr 23.6 days	Combined aerobic water/anaerobic sediment. Still considered valid as most aquatic sediments are anaerobic.

DACO	Study PMRA# compound	Review PMRA#	Endpoint	Additional information
			Virginia Whole system DT_{50} 512 days (SFO) DT_{90} 1702 days Water only DT_{50} 6.6 days (IORE) DT_{90} 100 days Tr 30.2 days	EFSA (PMRA# 3424313, page 44) reports very similar values for Old Basing as obtained by EAD.
8.2.4.2 Adsorption/ Desorption	1178030 Azoxystrobin	1650355 (page 35) Recalculated in 3231346	Hyde Farm (sandy clay loam) K_F 7.912 K_{FOC} 454.7 East Anglia (sandy loam) K_F 3.984 K_{FOC} 236.8 Kenny Hill (sandy loam) K_F 6.142 K_{FOC} 207.7 Lily Field (sand) K_F 1.485 K_{FOC} 511.9 Nebo (silt loam) K_F 9.385 K_{FOC} 577.8 Pickett Place (clay loam) K_d 17.363 K_{oc} 623.6	Moderate to low mobility
	1178042 Azoxystrobin	1650355 (page 39) Recalculated in 3231346	ERTC (sand) K_F 2.812 K_{FOC} 969.4 NRTC (silty clay loam) K_F 22.094 K_{FOC} 1029	Low mobility
8.3.2 Terrestrial Field Dissipation	712831; 1081410	DER 1724463 Recalculated in 3288145	Minto, MB (canola) 2001 DT_{50} 56.14 days (DFOP) DT_{90} 780.1 days Tr 311.79 days 2002 Concentrations of azoxystrobin constant over 84 days. Kinetic calculations could not be conducted	Minto, MB Cropped canola Only three azoxystrobin detections below 10 cm in two years. No detections below 10 cm for transformation products.
	712833 Quadris	DER 1724463 Recalculated in 3288145		
	712834 Quadris	DER 1724463 Recalculated in 3288145		
	712838 Quadris	DER 1530398 Recalculated in 3288145	Minto, MB (potato) DT_{50} 2.32 days (IORE) DT_{90} 172.9 days Tr 52.05 days Hunter River, PEI (potato) DT_{50} 5.6 days (IORE) DT_{90} 104.6 days Tr 31.47 days	
	1044331; 1081409 Quadris	DER 1530398 Recalculated in 3288145		
	1051108; 1051109;	DER 1723659 Recalculated in	Tile drain (µg/L) 2001	London, ON Turf study

DACO	Study PMRA# compound	Review PMRA#	Endpoint	Additional information
	1051110; 1051111; 1404078;	3288145	Dec – 0.03–25.84 2002 Jan – 0.78–14.61 Feb – 0.04–11.98 Mar – 0.14–3.45 Apr – 0.12–1.62 May – 0.16–12.39 Jun – 0.76 No flow Dec – 0.15–0.19 2003 Jan – <0.017–0.06 No flow Mar – <0.017–0.20 Apr – 0.02–0.24 May – 0.03 No flow Nov – <0.017–0.43 Dec – <0.017–0.03 2004 Jan – <0.017 Feb – <0.017–0.02 Mar – <0.017–0.4 Apr – <0.017–0.02 May – <0.017–5.38 Runoff (µg/L) 2002 Feb – 0.25–44.34 Mar – 0.14–46.23 2003 Mar – 0.09–0.7 2004 Mar – 0.03–0.45 May – 46.24	Tile drain concentrations in Plots 6 and 7
	1179740; 1179826; 1179862 YF9043 WG 80.5%	1650355 (page 54) Recalculated in 3288145	Carmen, MB DT_{50} 16.68 days (IORE) DT_{90} 2153 days Tr 648.05 days Saskatoon, SK DT_{50} 53.58 days (IORE) DT_{90} 647.3 days Tr 194.86 days Olds, AB DT_{50} 52.87 days (DFOP) DT_{90} 2345 days Tr 1317.61 days	No detections below 10 cm at any site. R234886 detected at Saskatoon and Olds, maximum 0.05 mg/kg R401553 detected at Saskatoon, maximum 0.01 mg/kg
	Comparison of laboratory to field dissipation		Laboratory soil dissipation range 56.4–248 days (DT_{50} or Tr) 80^{th} percentile 146.6 days (n = 9)	In general, the field dissipation studies are resulting in longer DT_{50} values than the laboratory data. As

DACO	Study PMRA# compound	Review PMRA#	Endpoint	Additional information
			Terrestrial field dissipation range 31.47–1317.6 days (DT_{50} or Tr) 80th percentile 641.1 days (n = 6)	multiple routes of dissipation are occurring in the field that are restricted in the laboratory, this is of concern. Generally, field dissipation rates are less persistent. This suggests a mechanism is in place that is impeding dissipation when used in the field.

* when all available data are combined (this includes those endpoints reported in the EFSA review document that were not submitted to the PMRA). Without access to the raw data the EFSA endpoints were not re-calculated using the current PMRA methods nor were they included in the water modelling inputs (aerobic soil n = 3, 90% upper confidence bound on the mean of 145 days).

Table 2.3 Available environmental fate data for azoxystrobin transformation products

DACO	Study PMRA# compound	Review PMRA#	Endpoint	Additional information
R234886 (Compound 2)				
8.2.3.4.2 Aerobic Soil Bio-transformation	NA	3424313 EFSA review (Page 35)	Frensham sandy loam Tr 45.2 days (DFOP) DT_{90} 2136 days Wisborough Green silty clay loam Tr 36.7 days (DFOP) DT_{90} 2124 days East Anglia loamy sand DT_{50} 56.5 days (SFO) DT_{90} 188 days Hyde Farm sandy clay loam DT_{50} 31.8 days (SFO) DT_{90} 105.6 days 18 Acres sandy clay loam DT_{50} 23.7 days (SFO) DT_{90} 78.8 days	Values as reported in the EFSA report. Slight to moderately persistent per Goring et al., 1975
8.2.4.2 Adsorption/ Desorption	1178043	1650355 (Page 42) Recalculated in 3288148	Hyde Farm K_F 0.849 K_{FOC} 48.76 East Anglia K_F 0.346 K_{FOC} 20.59 Kenny Hill K_F 0.819 K_{FOC} 27.68 Lilly Field K_F 1.41 K_{FOC} 486.3 Nebo	Very high mobility for Hyde Farm, East Anglia and Kenny Hill. Moderate mobility for Lilly Field, Nebo, and Pickett Place Per McCall et al., 1981.

DACO	Study PMRA# compound	Review PMRA#	Endpoint	Additional information
			K_F 6.699 K_{FOC} 412.5 Pickett Place K_F 9.923 K_{FOC} 356.4	
8.3.2 Terrestrial Field Dissipation	1051108; 1051109; 1051110; 1051111	DER: 1723659 3288145	Tile drain (µg/L) 2001 Dec – <0.017–4.8 2002 Jan – 0.12–2.78 Feb – <0.017–2.55 Mar – 0.05–1.50 Apr – 0.12–1.71 May – 0.21–5.14 Jun – 1.64 No flow Dec – 0.88–1.1 2003 Jan – 0.19–0.74 No flow Mar – 0.29–2.17 Apr – 0.34–1.72 May – 0.68 No flow Nov – 0.4–10.0 Dec – 0.3–2.89 2004 Jan – 0.15–1.18 Feb – 0.11–0.78 Mar – 0.6–4.69 Apr – 0.79–1.42 May – 0.12–30.6 Runoff (µg/L) 2002 Feb – 0.02–9.16 Mar – 0.48–3.47 2003 Mar – 0.19–1.91 2004 Mar – 0.15–0.89 May – 70.8	Turf Tile drain concentrations in Plots 6 and 7 Maximum detections of both runoff and tile drain concentrations were detected in May 2004 after four years of applications (2001 and 2002)
R230310 (Compound 9)				
8.3.2 Terrestrial Field Dissipation	1051108; 1051109; 1051110; 1051111	1723659 Recalculated in 3288145	Tile drain (µg/L) 2001 Dec – <0.017–0.38 2002 Jan – <0.017–0.11 Feb – <0.017–0.15 Mar – <0.017–0.03 Apr – <0.017–0.03 May – 0.03–0.26 Jun – <0.017 No flow	Turf Tile drain concentrations in Plots 6 and 7

DACO	Study PMRA# compound	Review PMRA#	Endpoint	Additional information
			Dec – <0.017 2003 Jan – <0.017 No flow Mar – <0.017 Apr – <0.017 May – 0.03 No flow Nov – <0.017 Dec – <0.017 2004 Jan – <0.017 Feb – <0.017 Mar – <0.017 Apr – <0.017 May – <0.017–0.02 Runoff (µg/L) 2002 Feb – <0.017–0.5 Mar – <0.017–0.54 2003 Mar – <0.017–0.02 2004 Mar – <0.017 May – 1.28	
R401553 (Compound 28)				
8.2.4.2 Adsorption/ Desorption	1178045	1650355 (page 45) Recalculated in 3288149	ERTC K_F 0.686 K_{FOC} 236.4 Champaign K_F 10.64 K_{FOC} 495.7 Hyde Farm K_F 1.938 K_{FOC} 111.3 Kenny Hill K_F 2.366 K_{FOC} 79.99 Wisborough Green K_F 1.47 K_{FOC} 61.82 Pickett Place K_d 2.917 K_{oc} 104.8	High to moderate mobility for all soils assessed. Per McCall et al., 1981.
R402173 (Compound 30)				
8.2.3.4.2 Aerobic Soil Bio-transformation	N/A	3424313 EFSA review (Page 36)	Frensham sandy loam DT_{50} 8.44 days SFO Wisborough Green silty clay loam DT_{50} 4.24 days SFO East Anglia loamy sand DT_{50} 9.8 days SFO	Non-persistent per Goring et al., 1975

DACO	Study PMRA# compound	Review PMRA#	Endpoint	Additional information
8.2.4.2 Adsorption/ Desorption	1178046	1650355 (Page 48) Recalculated in 3288150	ERTC K_d 0.324 K_{oc} 111.7 Champaign K_d 4.397 K_{oc} 204.9 Hyde Farm K_d 0.887 K_{oc} 50.96 Kenny Hill K_d 0.733 K_{oc} 24.78 Wisborough Green K_d 2.054 K_{oc} 86.37 Pickett Place K_d 3.01 K_{oc} 108.1	Very high to moderate mobility. Per McCall et al., 1981.

3 Environmental toxicology

Table 3.1 Ecotoxicity data for azoxystrobin used in the risk assessment

DACO	Study PMRA#	Review PMRA#*	Endpoint	Classification**	Comments
Terrestrial organisms					
9.2.3.2 – Chronic earthworms	NA	3424315 EFSA review (Page 101)	250 SC 8-wk NOEC 3.0 mg a.i./kg soil	-	
9.2.4.1 – Bee adult acute contact	1178012 2534912	1650355	48-h LD_{50} >200 µg a.i./bee	-	Gough et al., 1993. EFSA and USEPA report the same endpoint. Only one bee died. There were no sub-lethal effects observed at 24 or 48 hours. Endpoint previously used by PMRA, USEPA and EFSA for the bee risk assessment.
9.2.4.2 – Bee adult acute oral	1178012 2534912	1650355	48-h LD_{50} >25 µg a.i./bee	-	Gough et al., 1993. EFSA and USEPA report the same endpoint.

DACO	Study PMRA#	Review PMRA#*	Endpoint	Classification**	Comments
					Only one bee died. There were no sub-lethal effects observed at 24 or 48 hours. Endpoint previously used by PMRA, USEPA and EFSA for the bee risk assessment.
9.2.4.4 – Bee adult chronic	2702461	3245605	250 SC (A12705B) 10-d LD_{50} 17.4 µg a.i./bee/day 10-d LC_{50} 975 mg a.i./kg feeding solution 10-d NOED 10 µg a.i./bee/day	-	**Newly submitted study** (V. Tanzler, 2015). Study classification: acceptable. Mortality occurred in the three highest test item treated dose levels at 77.9, 22.2, 10 µg a.i./bee/day with 100, 66.7 and 16.7% mortality at test end (10 days following the start of chronic exposure). No mortality occurred in the two lowest test item treated dose levels at 6 and 2.4 µg a.i./bee/day and in the control (50% w/v sucrose solution). Sub-lethal effects Affected, moribund, cramps and/or apathy were observed in the three highest test item treatments only.
9.2.5 – Predators	NA	3424315 (Page 710)	*Typhlodromus pyri* Azoxystrobin FP – 250 g/L SC LR_{50} (mortality) >1500 g a.i./ha	-	Glass plate Effect: 34% corrected mortality at highest rate tested and 1.5 eggs per female at 1000 and 1500 g a.i./ha

DACO	Study PMRA#	Review PMRA#*	Endpoint	Classification**	Comments
			ER_{50} >1500 g a.i./ha LOER 1000 g a.i./ha NOER 500 g a.i./ha (reproduction)		(65% reduction in fecundity from the control). The fecundity results for the 1000 and 1500 g a.i./ha rates differed significantly from the control
	NA	3424315 EFSA (Page 723)	*Poecilus cupreus* Azoxystrobin, FP – 250 g/L SC 14 d-LR_{50} (mortality) >2 mg a.i./kg dry soi 14 d ER_{50} (feeding rate) >2 mg a.i./kg dry soil	Harmless	Soil Effect: Considered harmless to *Poecilus cupreus.*
9.2.6 – Parasitoids	NA	3424315 EFSA (Page 711)	*Aphidus rhopalosiphi* 250 g/L SC 48-h LR_{50} (mortality) >1000 g a.i./ha 48-h ER_{50} 200-1000 g a.i./ha LOER 1000 g a.i./ha NOER (reproduction) 200 g a.i./ha		Glass plate Effect: 5% mortality at highest rate tested and 16.5 mummies/female (64.5% lower than the untreated control (UTC)). The fecundity result differed from the UTC at the highest rate tested.
	712822 1081418	1724460	*Aphidus rhopalosiphi* 250 g/L SC 48-h LR_{50} (mortality) >1135 g a.i./ha 48-h ER_{50} >1135 g a.i./ha LOER 1135 g a.i./ha NOER (reproduction) 1000 g a.i./ha	-	Barley plant Effect: No harmful effects at rates up to 1000 g a.i./ha. Slightly harmful at highest application rate; 17% mortality at 1135 g a.i./ha and 19.0 mummies/ female (41.2% reduction in parasitization from the control). The highest treatment rate evaluated at which no

DACO	Study PMRA#	Review PMRA#*	Endpoint	Classification**	Comments
					statistically significant effects on fecundity were observed was 1000 g a.i./ha.
9.6.2.1 – Acute oral bobwhite quail (*Colinus virginanus*)	1178021	1650355 (Page 81)	LD_{50} >2130 mg a.i./kg bw	Practically non-toxic	Huntingdon Research Centre, 1992
9.6.2.3 – Acute other species	Not submitted	3424316 USEPA review (Page 39)	Canary (*Serinus canaria*) LD_{50} >2000 mg a.i./kg bw/day	Practically non-toxic	MRID 49337501
9.6.2.4 – Dietary bobwhite quail (*Colinus virginanus*)	1178022	1650355 (Page 82)	5-d LC_{50} >5290 mg a.i./kg feed 5-d LD_{50} >1179 mg a.i./kg bw/day	Practically non-toxic	Huntingdon Research Centre, 1992 The LD_{50} is the calculated endpoint presented in the EFSA and USEPA documents
9.6.2.5 – Dietary mallard duck (*Anas platyrhynchos*)	1178023	1650355 (Page 84)	5-d LC_{50} >5290 mg a.i./kg feed 5-d LD_{50} >3764 mg a.i./kg bw/day	Practically non-toxic	Huntingdon Research Centre, 1992
9.6.3.1 – Avian reproduction, bobwhite quail (*Colinus virginanus*)	NA	3424315 EFSA review (Page 80)	23-wk NOEC 1200 mg/kg bw/day 23-wk NOEL 117 mg a.i./kg bw/day	-	This value will be used in the risk assessment. No references in available studies. Is assumed to be the same study as reported by the USEPA.
9.6.3.2 – Avian reproduction, mallard duck (*Anas platyrhynchos*) Hatchlings to female	1178024	1650355 (Page 86)	23-wk NOEC 1200 mg a.i./kg feed 23-wk NOEL 175 mg a.i./kg bw/day	-	Huntingdon Research Centre, 1992
4.2.1 – Acute oral rat (*Rattus norvegicus*)	1177962	2888358 HED review (Page 19)	LD_{50} >5000 mg/kg bw/day	Practically non-toxic	EFSA reports the same endpoint (PMRA# 3424315, page 80) USEPA reports the same endpoint (PMRA#

DACO	Study PMRA#	Review PMRA#*	Endpoint	Classification**	Comments
					3424316) MRID 43678122 (Robinson, 1991)
4.3.1 – Chronic rat Sprague Dawley rat	1177956	2888358 HED review (Page 22)	90-d diet NOEL 20 mg a.i./kg bw/d	-	Effects were decreased body weight, increased liver weight, decreased food utilization, increased brain weight
4.5.1 – Reproduction, rat (*Rattus norvegicus*)	1177972 1177973 1177974	2888358 HED review (Page 23)	2 generational ~100 d exposure NOEL 34 mg a.i./kg bw/d (parent and progeny, reduced body weight) 165 mg a.i./kg bw/d (no effects on reproduction) Parents are dosed roughly 100 days (males until mating, females until pups are weened), similarly for pups.	-	The most sensitive endpoint is used in the risk assessment
9.8.4 – Terrestrial plants Seedling Emergence	1178034	1650355 (Page 104)	Seedling emergence Oilseed rape and carrot (*Brassica napus* and *Daucus carota*) EC_{25} >1120 g a.i./ha EC_{25} 661 g a.i./ha (USEPA endpoint from the same study)	-	Everett et al., 1995c Tier II in response to Canning et al., 1994a results, above. Only tested carrots and oilseed rape USEPA review reports an endpoint of EC_{25} 661 g a.i./ha (converted from lb a.i./A) for this study. The USEPA endpoint has been used in the risk assessment

DACO	Study PMRA#	Review PMRA#*	Endpoint	Classification**	Comments
	1178033	1650355 (Page 101)	Seedling emergence Velvetleaf (*Abutilon therophrasti*) EC_{25} >1120 g a.i./ha	-	Everett et al., 1995a Only tested velvetleaf based on issues with the Canning et al., 1994a study.
	NA	3424315 EFSA review (page 758, Part 9)	Seedling emergence 18-d EC_{25} >20 mg/kg soil (assuming soil depth of 15 cm and a bulk density of 1.5 g/cm^3, converts to 15 kg a.i./ha, for a 1 cm soil depth, this converts to 3 kg a.i./ha))	-	Frans et al., 1977 Lettuce (*Lactuca sativa*), radish (*Raphanus sativus*), wheat (*Triticum aestivum*)
9.8.4 – Terrestrial plants Vegetative Vigour	1178032	1650355 (Page 109)	Vegetative vigour *Brassica napa* 21-d EC_{25} >168 g a.i./ha	-	Everett et al., 1995b Only tested oilseed rape (*Brassica napa*). Not used in previous risk assessment, unclear why. This endpoint will be used in the risk assessment.
	NA	3424316 USEPA Same study as 1178031 already rejected by EAD	Vegetative vigour *Brassica napa* EC_{25} >1120 g a.i./ha (converted from 1.0 lbs a.i./A)	-	The USEPA review only provides a summary table of results and present the combined results of two studies. MRID 43678158 Canning et al., 1994, which has been rejected by the PMRA. MRID 43678159 Everett et al., 1995 Tier I only testing rape. The USEPA endpoint is less sensitive than the Canadian

DACO	Study PMRA#	Review PMRA#*	Endpoint	Classification**	Comments
					ednpoint. This endpoint will not be used.
Aquatic organisms					
9.3.2 – Acute daphnia sp.	1178013	1650355 (Page 70)	48-h EC_{50} 0.28 mg a.i./L	Highly toxic	
9.3.3 – Chronic daphnia sp.	1178015	1650355 (Page 73)	21-d NOEC 0.044 mg a.i./L	-	
9.3.4 – Other freshwater invertebrate species	Not submitted	3424315 EFSA review (Page 81)	Copepod (*Macrocyclops fuscus*) 48-h EC_{50} 0.13 mg/L	Highly toxic	This study was not submitted to PMRA but is the most sensitive acute freshwater invertebrate endpoint found. This value will be used in the risk assessment.
9.4.2 – Acute crustacean	2807514	DER 2921011	*Mysidopsis bahia* 96-h EC_{50} 0.055 mg a.i./L	Very highly toxic	Same study as reviewed by USEPA and EFSA.
9.4.5 – Chronic marine invertebrate	2807517	DER 2921014	*Mysidopsis bahia* 28-d NOEC 0.00954 mg/L (based on adult mortality)	-	Review of study based on USEPA and EFSA reviews
9.5.2.1 – Acute rainbow trout (*Oncorhynchus mykiss*)	1178016	1650355 (Page 75)	96-h LC_{50} 0.47 mg a.i./L	Highly toxic	
9.5.2.2 – Acute bluegill sunfish (*Lepomis macrochirus*)	1178018	1650355 (Page 77)	96-h LC_{50} 1.1 mg a.i./L	Moderately toxic	
9.5.2.4 – Acute marine fish	2807518	DER 2921015	Sheepshead minnow (*Cyprinodon variegates*) 96-h LC_{50} 0.66 mg a.i./L	Highly toxic	
9.5.3.1 – Fish, early life cycle	1178020	1650355 (Page 79)	Fathead minnow (*Pimephales promelas*) 33-d NOEC 0.147 mg a.i./L	-	
9.5.6 – Bioaccumulation	No study submitted	No data found in other reviews.	-	-	Not expected and the study requirement is not triggered based on the log K_{ow} of 2.5.
9.8.2 – Freshwater algae	To be uploaded	PMRA# 3424315 EFSA review	*Navicula pelliculosa* 120-h EbC_{50}	-	The study in the EFSA review appears to be

DACO	Study PMRA#	Review PMRA#*	Endpoint	Classification**	Comments
		(Page 82)	0.014 mg/L		different from the one previously reviewed by PMRA. This endpoint will be used in the risk assessment.
9.8.3 – Marine algae	To be uploaded	3424315EFSA review (Page 82)	*Skeletonema costatum* 72-h EbC_{50} 0.098 mg/L	-	The study in the EFSA review appears to be different from the one rejected by HC. The EFSA reported value will be used in the risk assessment.
9.8.5 – Aquatic vascular plants	1178035	1650355 (page 111)	*Lemna gibba* 14-d EC50 3.2 mg a.i./L (frond growth)	-	The previous PMRA endpoint will be used.
9.9 – Other studies Amphibian *Rana temporaria*	3267863	2903482	*Rana temporaria* 72-h LC_{50} 0.3 mg a.i./L (tadpole) 50-d NOEC 0.01 mg a.i./L Exposure from fertilization to metamorphosis. Response variables for chronic exposure were: body length, tail length, wet weight, survival, age at metamorphosis, and growth rate.	-	Johansson et al., 2006 This study will be used for acute affects but not for chronic.

*All endpoints were obtained from previous PMRA reviews unless otherwise specified.
** Classification per USEPA, 1985

Table 3.2 Ecotoxicity data for transformation products of azoxystrobin

DACO	Study PMRA#	Review PMRA#	Endpoint	Comments
R234886 (compound 2)	NA	3424315 EFSA review (Page 101)	*Eisenia fetida* Acute (time not specified) LC_{50} >1000 mg/kg soil	
	1178014	1650355 (Page 72)	Daphnia (*Daphnia magna*) 48-h EC_{50} >180 mg/L	Practically non-toxic (USEPA, 1985)
	1178017	1650355 (Page 76)	Rainbow trout (*Oncorhynchus mykiss*) 96-h LC_{50} >150 mg/L	Practically non-toxic (USEPA, 1985)
	1178028	1650355 (Page 95)	*Selenastrum capricornutum* 120-h EbC_{50} 47 mg/L	Slightly toxic (USEPA, 1985)
R401553 (compound 28)	NA	3424315 EFSA review (Page 102)	*Eisenia fetida* Acute (time not specified) LC_{50} >1000 mg/kg soil	
	NA	3424315 EFSA review (Page 82)	Daphnia (*Daphnia magna*) 48-h EC_{50} >120 mg/L	Practically non-toxic (USEPA, 1985)
	NA	3424316 USEPA review (Page 32)	Daphnia (*Daphnia magna*) 48-h EC_{50} >50 mg/L	Slightly toxic (USEPA, 1985)
	NA	3424315 EFSA review (Page 81)	Rainbow trout (*Oncorhynchus mykiss)* 96-hr LC_{50} >120 mg/L	Practically non-toxic (USEPA, 1985)
	NA	3424315 EFSA review (Page 82)	*Selenastrum capricornutum* 72-h EbC_{50} >120 mg/L	Practically non-toxic (USEPA, 1985)
R402173 (compound 30)	NA	3424315 EFSA review (Page 102)	*Eisenia fetida* Acute (time not specified) LC_{50} >1000 mg/kg soil	
	NA	3424315 EFSA review (Page 82)	Daphnia (*Daphnia magna*) 48-h EC_{50} >100 mg/L	Practically non-toxic (USEPA, 1985)
	NA	3424316 USEPA review (Page 32)	Daphnia (*Daphnia magna*) 48-h EC_{50} >50 mg/L	Slightly toxic (USEPA, 1985)
	NA	3424315 EFSA review (Page 81)	Rainbow trout (Oncorhynchus mykiss) 96-hr LC_{50} 62 mg/L	Slightly toxic (USEPA, 1985)
	NA	3424315 EFSA review (Page 82)	*Selenastrum capricornutum* 72-h EbC_{50} 67.0 mg/L	Slightly toxic (USEPA, 1985)

4 Estimated environmental concentrations

Table 4.1 Screening and drift estimated environmental concentrations in soil and water for azoxystrobin

	Crops											
	Canola		**Potato**		**Turf (with snow mould)**	**Turf (without snow mould)**	**Highbush blueberries**		**Filberts**		**Radish**	**Sunflower**
Rate (g a.i./ha)	**1 × 75**		**3 × 200 @ 7 days**		**600 + 1920 @ 45 days**	**(4 × 600) + 300 @ 10 days**	**4 × 75 @ 7 days**		**4 × 225 @ 7, 21, and 7 day**		**1 × 1500**	**1 × 2.3**
Application method	Ground boom	Aerial	Ground boom	Aerial	Ground boom	Ground boom	Early airblast	Late airblast	Early airblast	Late airblast	In-furrow	Seed treatment
Spray drift correction	6%	23%	6%	23%	6%	6%	74%	59%	74%	59%	N/A	N/A
Maximum screening soil EEC mg a.i./kg soil	0.033	N/A	0.257	N/A	1.069	1.083	0.065	N/A	0.365	N/A	0.67	0.000098
Maximum drift refinement soil EEC mg a.i./kg soil	0.002	0.008	N/A	0.059	0.064	0.065	0.048	0.039	0.27	0.21	N/A	N/A
Maximum screening 15 cm water EEC mg a.i./L	0.05	N/A	0.40	N/A	1.66	1.75	0.10	N/A	0.57	N/A	1.0	0.0015
Maximum screening 80 cm water EEC mg a.i./L	0.009	N/A	0.073	N/A	0.31	0.33	0.019	N/A	0.11	N/A	0.19	0.00028
Maximum drift refinement 15 cm water EEC mg a.i./L	0.003	0.012	N/A	0.090	0.099	0.11	0.073	0.058	0.42	0.34	N/A	N/A
Maximum drift refinement 80 cm water EEC mg a.i./L	0.0006	0.002	N/A	0.017	0.019	0.020	0.014	0.011	0.079	0.063	N/A	N/A

	Crops											
	Canola		Potato		Turf (with snow mould)	Turf (without snow mould)	Highbush blueberries		Filberts		Radish	Sunflower
Rate (g a.i./ha)	**1 × 75**		**3 × 200 @ 7 days**		**600 + 1920 @ 45 days**	**(4 × 600) + 300 @ 10 days**	**4 × 75 @ 7 days**		**4 × 225 @ 7, 21, and 7 day**		**1 × 1500**	**1 × 2.3**
Maximum drift refinement 80 cm water EEC mg a.i./L	0.0006	0.002	N/A	0.006	0.014	0.0045	0.007	0.006	0.021	0.017	N/A	N/A

Table 4.2 Maximum and mean azoxystrobin residues on potential food items for birds and mammals for turf (with snow mould)

Environmental compartment	Fresh/dry weight ratios	Maximum residue concentration				Mean residue concentration			
		Concentration fresh weight (mg t.s./kg, FW)		Concentration fresh weight (mg t.s./kg, DW)		Concentration fresh weight (mg t.s./kg, FW)		Concentration fresh weight (mg t.s./kg, DW)	
		on-field	off-field	on-field	off-field	on-field	off-field	on-field	off-field
Short grass	3.3	416.6	25.0	1374.7	82.5	147.9	8.9	488.2	29.3
Long grass	4.4	190.8	11.4	839.3	50.4	62.3	3.7	274.1	16.4
Broadleaf plants	5.4	235.5	14.1	1271.9	76.3	77.9	4.7	420.5	25.2
Insects	3.8	163.5	9.8	621.3	37.3	112.9	6.8	429.0	25.7
Grain and seeds	3.8	25.3	1.5	96.2	5.8	12.1	0.7	45.9	2.8
Fruits	7.6	25.3	1.5	192.3	11.5	12.1	0.7	91.7	5.5

Note: This table is provided as an example of what is calculated for the amounts on plants. The data for all other uses is located within the risk assessment tables due to the high volume of uses that were assessed.

Table 4.3 Foliar application: Infield and off field exposure of azoxystrobin on plant surfaces after application at highest single foliar application rate

Foliar application method	Drift deposition adjustment factor %	Highest in-field single application rate (g a.i./ha)	Maximum off-field spray drift (g a.i./ha)
Aerial	26	250	65
Airblast (Early Season)	74	304	225
Airblast (Late Season)	59	304	179
Ground Field Sprayer (fine droplet size)	11	1920	211

5 Environmental risk assessment

5.1 Terrestrial risk assessment

Earthworm and terrestrial plants

Table 5.1.1 Screening level and drift refinement risk to earthworm and terrestrial

Organism	Exposure	Effect Metrics (g a.i./ha)	Screening EEC (g a.i./ha)	Screening RQ	Screening LOC Exceeded?	Drift EEC (g a.i./ha)	Drift RQ	Drift LOC Exceeded?
Groundboom - turf without snow mould application (4 × 600 g a.i./ha + 1 × 300 g a.i./ha)								
Earthworm (*Eisenia fetida*)	56-d chronic	NOEC/1 = 3000	1083.8	= 0.36	No	65.0	0.02	No
Oilseed rape and carrot (*Brassica napus* and *Daucus carota*)	8-d seedling emergence	ER_{25}/1 = 661	2438.5	**3.7**	**Yes**	146.3	0.22	No
Groundboom - turf with snow mould application (1 × 600 g a.i./ha + 1 × 1920 g a.i./ha)								
Oilseed rape (*Brassica napa*)	21-d Vegetative vigour	ER_{25}/1 > 168	1946.5	**< 11.6**	**Yes**	116.8	< 0.7	No
Groundboom - Canola (1 × 75 g a.i./ha)								
Earthworm (*Eisenia fetida*)	56-d chronic	ER_{25}/1 = 661	33.3	= 0.01	No	2.0	< 0.01	No
Oilseed rape and carrot (*Brassica napus* and	8-d seedling emergence	ER_{25}/1 > 168	75.0	= 0.11	No	4.5	< 0.01	No

Organism	**Exposure**	**Effect Metrics (g a.i./ha)**	**Screening EEC (g a.i./ha)**	**Screening RQ**	**Screening LOC Exceeded?**	**Drift EEC (g a.i./ha)**	**Drift RQ**	**Drift LOC Exceeded?**
Daucus carota)								
Oilseed rape (*Brassica napa*)	21-d Vegetative vigour	ER_{25}/1 = 661	75.0	< 0.45	No	4.5	< 0.03	No
Early airblast - Highbush blueberries (2 × 75 g a.i./ha)								
Earthworm (*Eisenia fetida*)	56-d chronic	NOEC/1 = 3000	65.4	= 0.02	No	48.4	= 0.02	No
Oilseed rape and carrot (*Brassica napus* and *Daucus carota*)	8-d seedling emergence	ER_{25}/1 = 661	147.1	= 0.22	No	108.8	= 0.16	No
Oilseed rape (*Brassica napa*)	21-d Vegetative vigour	ER_{25}/1 > 168	121.2	< 0.72	No	89.7	< 0.53	No
Early airblast - Filberts (3 × 225 g a.i./ha)								
Earthworm (*Eisenia fetida*)	56-d chronic	NOEC/1 = 3000	363.4	= 0.12	No	268.9	= 0.09	No
Oilseed rape and carrot (*Brassica napus* and *Daucus carota*)	8-d seedling emergence	ER_{25}/1 = 661	817.6	**= 1.2**	**Yes**	605.0	= 0.92	No
Oilseed rape (*Brassica napa*)	21-d Vegetative vigour	ER_{25}/1 > 168	415.7	**< 2.5**	**Yes**	307.6	**< 1.8**	**Yes**
Late airblast - Highbush blueberry (2 × 75 g a.i./ha)								
Earthworm (*Eisenia fetida*)	56-d chronic	NOEC/1 = 3000	65.4	= 0.02	No	38.6	= 0.01	No
Oilseed rape and carrot (*Brassica napus* and *Daucus carota*)	8-d seedling emergence	ER_{25}/1 = 661	147.1	= 0.22	No	86.8	= 0.13	No
Oilseed rape (*Brassica napa*)	21-d Vegetative vigour	ER_{25}/1 > 168	121.2	< 0.72	No	71.5	< 0.43	No
Late airblast - Filbert (3 × 225 g a.i./ha)								
Earthworm (*Eisenia fetida*)	56-d chronic	NOEC/1 = 3000	363.4	= 0.12	No	268.9	= 0.09	No
Oilseed rape and carrot (*Brassica napus* and *Daucus carota*)	8-d seedling emergence	ER_{25}/1 = 661	817.6	**= 1.2**	**Yes**	605.0	= 0.92	No
Oilseed rape (*Brassica napa*)	21-d Vegetative vigour	ER_{25}/1 > 168	415.7	**< 2.5**	**Yes**	307.6	**< 1.8**	Yes

Organism	Exposure	Effect Metrics (g a.i./ha)	Screening EEC (g a.i./ha)	Screening RQ	Screening LOC Exceeded?	Drift EEC (g a.i./ha)	Drift RQ	Drift LOC Exceeded?
Aerial – canola 1 × 75 g a.i./ha)								
Earthworm (*Eisenia fetida*)	56-d chronic	NOEC/1 = 3000	33.33333	= 0.01	No	7.666667	< 0.01	No
Oilseed rape and carrot (*Brassica napus* and *Daucus carota*)	8-d seedling emergence	ER_{25}/1 = 661	75	= 0.11	No	17.25	= 0.03	No
Oilseed rape (*Brassica napa*)	21-d Vegetative vigour	ER_{25}/1 > 168	75	< 0.45	No	17.25	< 0.1	No
Aerial – potato 3 × 200 g a.i./ha								
Earthworm (*Eisenia fetida*)	56-d chronic	NOEC/1 = 3000	256.4065	= 0.09	No	58.9735	= 0.02	No
Oilseed rape and carrot (*Brassica napus* and *Daucus carota*)	8-d seedling emergence	ER_{25}/1 = 661	576.9146	= 0.87	No	132.6904	= 0.2	No
Oilseed rape (*Brassica napa*)	21-d Vegetative vigour	ER_{25}/1 > 168	398.9286	**< 2.4**	**Yes**	91.75357	< 0.55	No
In-furrow application to radish (1 × 1500 g a.i./ha)								
Earthworm (*Eisenia fetida*)	56-d chronic	NOEC/1 = 3000	666.7	= 0.22	No	N/A	N/A	N/A
Oilseed rape and carrot (*Brassica napus* and *Daucus carota*)	8-d seedling emergence	ER_{25}/1 = 661	1500.0	**= 2.3**	**Yes**	N/A	N/A	N/A
Oilseed rape (*Brassica napa*)	21-d Vegetative vigour	ER_{25}/1 > 168	1500.0	**< 8.9**	**Yes**	N/A	N/A	N/A

Bolded values indicate an exceedance of the level of concern (LOC)

Pollinators and beneficial arthropods

Table 5.1.2 Foliar application: Acute contact risk to adult bees based on screening level exposure estimates for azoxystrobin

Application rate (EEC) (kg a.i./ha)	Koch and Weiber (adjustment factor) (µg a.i./bee per kg a.i./ha)	Exposure estimate for bees* (µg a.i./bee/day)	Toxicity endpoint (µg a.i./bee/day)	RQ**	LOC exceeded
1.92	2.4	4.61	LD_{50}: > 200	< 0.023	No

*Exposure estimate for bees= application rate (kg a.i./ha) × adjustment factor
**Exposure estimate for bees/toxicity endpoint
Note: LOC for bee is set at 0.4.

Table 5.1.3 Foliar application: Acute and chronic dietary risk to adult bees based on screening level exposure estimates for azoxystrobin

Application rate (EEC) (kg a.i./ha)	Adjustment factor (µg a.i./bee per kg a.i./ha)	Exposure estimate for bees* (µg a.i./bee/day)	Toxicity endpoint (µg a.i./bee/day)	RQ**	LOC exceeded
Adults (Acute)					
1.92	28.6	54.94	LD_{50}: > 25	**< 2.2**	**Yes**
0.60	28.6	17.17	LD_{50}: > 25	**<0.7**	**Yes**
0.304	28.6	8.7	LD_{50}: > 25	<0.35	No
Adults (Chronic)					
1.92	28.6	54.94	NOED: 10	**5.5**	**Yes**
0.600	28.6	17.17	NOED: 10	**1.7**	**Yes**
0.304	28.6	8.7	NOED: 10	0.867	No

*Exposure estimate for bees = application rate (kg a.i./ha) × adjustment factor (28.6 µg a.i./bee per kg a.i./ha for adults)
**Exposure estimate for bees/toxicity endpoint
Note: LOC for bees is set at 0.4 for acute endpoints and 1.0 for chronic endpoints.

Table 5.1.4 Foliar application: Acute and chronic risk (contact and/or oral) to bees from spray drift based on screening level exposure to azoxystrobin

Bee stage	Exposure	Adjustment factor	Exposure estimate for bees* (µg a.i./bee/day)	Toxicity endpoint (µg a.i./bee/day)	RQ**	LOC exceeded
Aerial Spray (26% drift): 0.065 kg a.i./ha (maximum off-field spray drift)						
Adult	Acute contact	2.4	0.156	LD_{50}: >200	<0.001	No
	Acute oral	28.6	1.86	LD_{50}: >25	<0.07	No
	Chronic oral	28.6	1.86	NOED: 10	0.19	No
Airblast - early season (74% drift): 0.225 kg a.i./ha (maximum off-field spray drift)						
Adult	Acute contact	2.4	0.54	LD_{50}: >200	<0.003	No
	Acute oral	28.6	6.44	LD_{50}: >25	<0.26	No
	Chronic oral	28.6	6.44	NOED: 10	0.64	No
Airblast - late season (59% drift): 0.179 kg a.i./ha (maximum off-field spray drift)						
Adult	Acute	2.4	0.43	LD_{50}: >200	<0.002	No

Bee stage	Exposure	Adjustment factor	Exposure estimate for bees* (µg a.i./bee/day)	Toxicity endpoint (µg a.i./bee/day)	RQ**	LOC exceeded
	contact					
	Acute oral	28.6	5.12	LD_{50}: >25	<0.20	No
	Chronic oral	28.6	5.12	NOED: 10	0.51	No
Ground field spray (11% drift): 0.211 kg a.i./ha (maximum off-field spray drift)						
Adult	Acute contact	2.4	0.51	LD_{50}: >200	<0.003	No
	Acute oral	28.6	6.03	LD_{50}: >25	<0.24	No
	Chronic oral	28.6	6.03	NOED: 10	0.60	No

*Exposure estimate for bees= application rate (kg a.i./ha) × adjustment factor (µg a.i./bee per kg a.i./ha)
**Exposure estimate for bees/toxicity endpoint
Note: LOC for bees is set at 0.4 for acute endpoints and 1.0 for chronic endpoints.

Table 5.1.5 Seed treatment: Acute and chronic dietary risk to adult bees based on screening level exposure estimates for azoxystrobin

Exposure	EEC (µg a.i./g)	Exposure estimate for bees* (µg a.i./bee/day)	Toxicity endpoint (µg a.i./bee/day)	RQ**	LOC exceeded
Adult acute oral	1	0.292	LD_{50}: > 25	<0.012	No
Adult chronic oral	1	0.292	NOED: 10	0.029	No

*Exposure Estimate for bees = 0.292 × EEC for adults
**Exposure estimate for bees/toxicity endpoint
Note: LOC for bee is set at 0.4 for acute endpoints and 1 for chronic endpoints.

Table 5.1.6 Soil Application: Acute and chronic dietary risk to bees based on screening level exposure estimates for azoxystrobin (K_{oc} = 201)

Exposure	Application rate (kg a.i./ha)	Briggs EEC (µg a.i./g)	Exposure Estimate for Bees* (µg a.i./bee/day)	Toxicity endpoint (µg a.i./bee/day)	RQ**	LOC exceeded
Adult acute oral	1.5	0.719	0.210	LD_{50}: >25	<0.008	No
Adult chronic oral	1.5	0.719	0.210	NOED: 10	0.02	No

*Exposure estimate for bees = 0.292 × Briggs EEC for adults
**Exposure estimate for bees/toxicity endpoint
Note: LOC for bee is set at 0.4 for acute endpoints and 1 for chronic endpoints.

Table 5.1.7 Soil application: Acute and chronic dietary risk to bees based on screening level exposure estimates for azoxystrobin (K_{oc} = 831)

Exposure	Application rate (kg a.i./ha)	Briggs EEC (µg a.i./g)	Exposure Estimate for Bees* (µg a.i./bee/day)	Toxicity endpoint (µg a.i./bee/day)	RQ**	LOC exceeded
Adult acute oral	1.5	0.183	0.053	LD_{50}: >25	<0.002	No
Adult chronic oral	1.5	0.183	0.053	NOED: 10	0.005	No

*Exposure estimate for bees = 0.292 × Briggs EEC for adults
**Exposure estimate for bees/toxicity endpoint
Note: LOC for bee is set at 0.4 for acute endpoints and 1 for chronic endpoints.

Table 5.1.8 Soil application: Acute and chronic dietary risk to bees based on screening level exposure estimates for azoxystrobin (K_{oc} = 1029)

Exposure	Application rate (kg a.i./ha)	Briggs EEC (µg a.i./g)	Exposure Estimate for Bees* (µg a.i./bee/day)	Toxicity endpoint (µg a.i./bee/day)	RQ**	LOC exceeded
Adult acute oral	1.5	0.148	0.043	LD_{50}: >25	<0.002	No
Adult chronic oral	1.5	0.148	0.043	NOED: 10	0.004	No

*Exposure estimate for bees = 0.292 × Briggs EEC for adults
**Exposure estimate for bees/toxicity endpoint
Note: LOC for bee is set at 0.4 for acute endpoints and 1 for chronic endpoints.

Table 5.1.9 Screening level risk assessment for beneficial arthropods for representative use of azoxystobin (in-field and off-field)

Organism	Crop	Application method	Exposure	EEC[1]	Endpoint[2]	Units	RQ[3]	LOC exceeded?
Predatory mite *Typhlodromus pyri* (glass plate)	Turf	Ground boom-medium	In-field	1947	LR_{50}>1500	g a.i./ha	<1.3	No
			Off-field- (6% drift)	117	LR_{50}>1500	g a.i./ha	<0.08	No
	Filberts	Airblast	In-field	416	LR_{50}>1500	g a.i./ha	<0.28	No
			Off-field (early season - 74% drift)	308	LR_{50}>1500	g a.i./ha	<0.21	No
			Off-field (late season - 59% drift)	245	LR_{50}>1500	g a.i./ha	<0.16	No
	Potato	Aerial	In-field	399	LR_{50}>1500	g a.i./ha	<0.27	No
			Off-field (23% drift)	92	LR_{50}>1500	g a.i./ha	<0.06	No

Organism	Crop	Application method	Exposure	EEC[1]	Endpoint[2]	Units	RQ[3]	LOC exceeded?
Parasitoid wasp *(Aphidius rhopalosiphi)*	Turf	Ground boom-medium	In-field	1947	LR_{50}>1000	g a.i./ha	**<2.0**	**Yes**
			Off-field (6% drift)	117	LR_{50}>1000	g a.i./ha	<0.12	No
	Filberts	Airblast	In-field	416	LR_{50}>1000	g a.i./ha	<0.42	No
			Off-field (early season - 74% drift)	308	LR_{50}>1000	g a.i./ha	<0.31	No
			Off-field (late season - 59% drift)	245	LR_{50}>1000	g a.i./ha	<0.25	No
	Potato	Aerial	In-field	399	LR_{50}>1000	g a.i./ha	<0.40	No
			Off-field (23% drift)	92	LR_{50}>1000	g a.i./ha	<0.09	No

EEC = estimated environmental concentration, RQ = Risk Quotient; LOC = Level of Concern

[1] in-field EEC = cumulative application rate; off-field EEC = cumulative application rate × drift factor. The cumulative application rate is based on a default foliar DT_{50} of 10 days for foliar dissipation. The off-field risk assessment is based on a maximum spray drift of 6% for ground boom sprayers, 59% and 74% for early and late season airblast sprayers, respectively and 23% for aerial applications.

[2] Toxicity endpoints are based on tier 1 (glass plate) studies.

[3] RQ = EEC / endpoint value; bolded values indicate that the RQ exceeds the LOC. LOC = 2 for glass plate studies using the standard beneficial arthropod test species, *Typhlodromus pyri* and *Aphidius rhopalosiphi* only and unrefined EECs.

Bolded values indicate an exceedance of the level of concern (LOC).

Table 5.1.10 Refined risk assessment for beneficial arthropods for representative use of azoxystrobin considering extended lab endpoints

Organism	Crop	Application method	Exposure	EEC[1]	Endpoint[2]	Units	RQ[3]	LOC exceeded?
Foliar dwelling								
Parasitoid wasp *(Aphidius rhopalosiphi)*	Turf	Ground boom-medium	In-field	1947	ER/LR_{50}>1135	g a.i./ha	**<1.7**	**Yes**
			Off-field-(6% drift)	117	ER/LR_{50}>1135	g a.i./ha	<0.10	No
Soil dwelling								
Ground beetle (*Poecilus cupreus*)	Turf	Ground boom-medium	In-field	1.07	ER/LR_{50} >2	mg a.i./kg	<0.54	No
	Filbert	Airblast	In-field	0.365	ER/LR_{50} >2	mg a.i./kg	<0.18	No
	Potato	Aerial	In-field	0.26	ER/LR_{50} >2	mg a.i./kg	<0.13	No
	Radish	In-furrow	In-field	0.67	ER/LR_{50} >2	mg a.i./kg	<0.34	No
	Sunflower	Seed treatment	In-field	0.00098	ER/LR_{50} >2	mg a.i./kg	<<0.001	No

EEC = estimated environmental concentration, RQ = Risk Quotient; LOC = Level of Concern

[1] Foliar Dwelling Arthropod: in-field EEC = cumulative application rate; off-field EEC = cumulative application rate × drift factor. The cumulative application rate is based on a default foliar DT_{50} of 10 days. The off-field risk assessment is based on a

maximum spray drift of 6% for ground boom sprayers.
Soil Dwelling Arthropod: in-field EEC = cumulative application rate. The cumulative application rate is based on an aerobic soil DT_{50} value of 128 days. Concentrations were calculated assuming that the product is evenly distributed in the top 0 to 15 cm depth of soil with a bulk density of 1.5 g/cm^3.

[2] Toxicity endpoints based on Tier 1 extended laboratory studies.

[3] RQ = EEC / endpoint value; bolded values indicate that the RQ exceeds the LOC. LOC = 1 for extended laboratory studies.

Bolded values indicate an exceedance of the level of concern (LOC).

Table 5.1.11 Refined in-field and off-field risk assessment for beneficial arthropods for turf uses of azoxystrobin considering foliar deposition factors (refined EEC)

Organism	Crop	Cumulative rate[1] (g a.i./ha)	In-field					Off-field			
			Foliar Deposition Fraction [2] (F_{Int})	EEC[3] (g a.i./ha)	Endpoint (g a.i./ha)[5]	RQ	LOC exceeded?	Drift EEC x vegetation distribution	EEC[4] (g a.i./ha)	RQ[6]	LOC exceeded
Parasitoid wasp *(Aphidius rhopalosiphi)*	Turf	1947	0.40	779	ER_{50}/LR_{50}>1135	<0.69	No	117 × 0.10	11.7	<0.01	No

EEC = estimated environmental concentration, RQ = Risk Quotient; LOC = Level of Concern, F_{INT} = Foliar Deposition Fraction

[1] The cumulative application rate is based on a default foliar DT_{50} of 10 days

[2] Foliar deposition fraction, based on most suitable crop group (EAD Guidance document, Characteristics of risk to predatory and parasitic arthropods, version 15, 2010-Jun-10); turf based on Grass I.

[3] in-field EEC = (cumulative application rate × foliar deposition factor).

[4] off-field EEC = (in-field EEC × drift factor × vegetation distribution factor 0.10). The off-field risk assessment for turf is based on a maximum spray drift of 6% for ground boom sprayers.

[5] Toxicity endpoint based on Tier 1 extended laboratory (barley plant) studies.

[6] RQ = EEC / endpoint value; bolded values indicate that the RQ exceeds the LOC. LOC = 1 for extended laboratory studies using the standard beneficial arthropod test species, *Typhlodromus pyri* and *Aphidius rhopalosiphi* only.

Birds and Mammals

Table 5.1.12 Azoxystrobin screening level risk to birds and mammals for turf with snow mould application (1 × 600 g a.i./ha + 1 × 1920 g a.i./ha)

Organism	Study type	Effect metrics (mg a.i./kg BW per day)	Food guild	Estimated daily intake (assuming high residue levels on food, mg a.i./kg BW per day)	Screening assessment RQs	LOC exceeded?
Northern bobwhite (*Colinus virginianus*)	Acute	$LD_{50}/10$ > 213	Small insectivore birds	158	< 0.74	No
			Medium insectivore birds	124	< 0.58	No
			Large herbivore birds	79.9	< 0.38	No
House finch (*Carpodacus mexicanus*)	Acute	$LD_{50}/10$ > 200	Small insectivore birds	158	< 0.79	No
			Medium insectivore birds	124	< 0.62	No
			Large herbivore birds	79.9	< 0.4	No
Northern bobwhite (*Colinus virginianus*)	Dietary	$LD_{50}/10$ > 117.9	Small insectivore bird	158	**< 1.3**	**Yes**
			Medium insectivore birds	124	**< 1.1**	**Yes**
			Large herbivore birds	79.9	< 0.68	No
Mallard (*Anas platyrhynchos*)	Dietary	$LD_{50}/10$ > 376.4	Small insectivore birds	158	< 0.42	No
			Medium insectivore birds	124	< 0.33	No
			Large herbivore birds	79.9	< 0.21	No
Northern bobwhite (*Colinus virginianus*)	Reproduction	NOAEL/1 = 117	Small insectivore birds	158	**= 1.3**	**Yes**
			Medium insectivore birds	124	**= 1.1**	**Yes**
			Large	79.9	= 0.68	No

Organism	Study type	Effect metrics (mg a.i./kg BW per day)	Food guild	Estimated daily intake (assuming high residue levels on food, mg a.i./kg BW per day)	Screening assessment RQs	LOC exceeded?
			herbivore birds			
Mallard (*Anas platyrhynchos*)	Reproduction	NOAEL/1 = 214	Small insectivore birds	158	= 0.74	No
			Medium insectivore birds	124	= 0.58	No
			Large herbivore birds	79.9	0.37	No
Norway rat (*Rattus norvegicus*)	Acute	LD_{50}/10 >500	Small insectivore mammals	90.2	<0.18	No
			Medium herbivore mammals	172	<0.34	No
			Large herbivore mammals	94.5	<0.19	No
Norway rat (*Rattus norvegicus*)	Reproduction	NOAEL/1 = 34	Small insectivore mammals	90.2	**2.7**	**Yes**
			Medium insectivore mammals	172	**5**	**Yes**
			Large herbivore mammals	94.5	**2.8**	**Yes**

Bolded values indicate an exceedance of the level of concern (LOC).

Table 5.1.13 Azoxystrobin on turf (with snow mould) applied by field sprayer with medium-spray droplet size (6% drift)

Effect metrics (mg a.i./kg BW per day)		Food guild (food item)	Maximum nomogram residues				Mean nomogram residues			
			On-field		Off-field drift: 6%		On-field		Off-field drift: 6%	
			EDE (mg a.i./kg bw)	RQ	EDE (mg a.i./kg bw)	RQ	EDE (mg a.i./kg bw)	RQ	EDE (mg a.i./kg bw)	RQ
Small bird (0.02 kg)										
Dietary azoxystrobin,	117.9	Insectivore	158	**< 1.3**	9.47	< 0.08	109	< 0.92	6.54	< 0.06

Effect metrics (mg a.i./kg BW per day)		Food guild (food item)	Maximum nomogram residues				Mean nomogram residues			
			On-field		Off-field drift: 6%		On-field		Off-field drift: 6%	
			EDE (mg a.i./kg bw)	RQ	EDE (mg a.i./kg bw)	RQ	EDE (mg a.i./kg bw)	RQ	EDE (mg a.i./kg bw)	RQ
Northern bobwhite (*Colinus virginianus*) LD_{50}/10		Granivore (grain and seeds)	24.4	< 0.21	1.47	< 0.01	11.6	< 0.1	0.7	< 0.01
		Frugivore (fruit)	48.8	< 0.41	2.93	< 0.02	23.3	< 0.2	1.4	< 0.01
Reproduction azoxystrobin, Northern bobwhite (*Colinus virginianus*) NOAEL/1	117	Insectivore	158	**= 1.3**	9.47	= 0.08	109	= 0.93	6.54	= 0.06
		Granivore (grain and seeds)	24.4	= 0.21	1.47	= 0.01	11.6	= 0.1	0.7	< 0.01
		Frugivore (fruit)	48.8	= 0.42	2.93	= 0.03	23.3	= 0.2	1.4	= 0.01
Medium-sized bird (0.1 kg)										
Dietary azoxystrobin, Northern bobwhite (*Colinus virginianus*) LD_{50}/10	117.9	Insectivore	124	**< 1.1**	7.44	< 0.06	85.6	< 0.73	5.13	< 0.04
		Granivore (grain and seeds)	19.2	< 0.16	1.15	< 0.01	9.15	< 0.08	0.55	< 0.01
		Frugivore (fruit)	38.4	< 0.33	2.3	< 0.02	18.3	< 0.16	1.1	< 0.01
Reproduction azoxystrobin, Northern bobwhite (*Colinus virginianus*) NOAEL/1	117	Insectivore	124	**= 1.1**	7.44	= 0.06	85.6	= 0.73	5.13	= 0.04
		Granivore (grain and seeds)	19.2	= 0.16	1.15	< 0.01	9.15	= 0.08	0.55	< 0.01
		Frugivore (fruit)	38.4	= 0.33	2.3	= 0.02	18.3	= 0.16	1.1	< 0.01
Large-sized bird (1 kg)										
Dietary azoxystrobin, Northern bobwhite (*Colinus virginianus*) LD_{50}/10	117.9	Insectivore	36.1	< 0.31	2.17	< 0.02	24.9	< 0.21	1.5	< 0.01
		Granivore (grain and seeds)	5.59	< 0.05	0.34	< 0.01	2.67	< 0.02	0.16	< 0.01
		Frugivore (fruit)	11.2	< 0.09	0.67	< 0.01	5.33	< 0.05	0.32	< 0.01
		Herbivore (short grass)	79.9	< 0.68	4.8	< 0.04	28.4	< 0.24	1.7	< 0.01

Effect metrics (mg a.i./kg BW per day)		Food guild (food item)	Maximum nomogram residues				Mean nomogram residues			
			On-field		Off-field drift: 6%		On-field		Off-field drift: 6%	
			EDE (mg a.i./kg bw)	RQ	EDE (mg a.i./kg bw)	RQ	EDE (mg a.i./kg bw)	RQ	EDE (mg a.i./kg bw)	RQ
		Herbivore (long grass)	48.8	< 0.41	2.93	< 0.02	15.9	< 0.14	0.96	< 0.01
		Herbivore (Broadleaf plants)	74	< 0.63	4.44	< 0.04	24.5	< 0.21	1.47	< 0.01
Reproduction azoxystrobin, Northern bobwhite (*Colinus virginianus*) NOAEL/1	117	Insectivore	36.1	= 0.31	2.17	= 0.02	24.9	= 0.21	1.5	= 0.01
		Granivore (grain and seeds)	5.59	= 0.05	0.34	< 0.01	2.67	= 0.02	0.16	< 0.01
		Frugivore (fruit)	11.2	= 0.1	0.67	< 0.01	5.33	= 0.05	0.32	< 0.01
		Herbivore (short grass)	79.9	= 0.68	4.8	= 0.04	28.4	= 0.24	1.7	= 0.01
		Herbivore (long grass)	48.8	= 0.42	2.93	= 0.03	15.9	= 0.14	0.96	< 0.01
		Herbivore (Broadleaf plants)	74	= 0.63	4.44	= 0.04	24.5	= 0.21	1.47	= 0.01
Small mammal (0.015 kg)										
Reproduction azoxystrobin, Norway rat (*Rattus norvegicus*) NOAEL/1	34	Insectivore	90.2	**= 2.7**	5.41	= 0.16	62.3	**= 1.8**	3.74	= 0.11
		Granivore (grain and seeds)	14	= 0.41	0.84	= 0.02	6.66	= 0.2	0.4	= 0.01
		Frugivore (fruit)	27.9	= 0.82	1.67	= 0.05	13.3	= 0.39	0.8	= 0.02
Medium-sized mammal (0.035 kg)										
Reproduction azoxystrobin, Norway rat (*Rattus norvegicus*) NOAEL/1	34	Insectivore	77.5	**= 2.3**	4.65	= 0.14	53.5	**= 1.6**	3.21	= 0.09
		Granivore (grain and seeds)	12	= 0.35	0.72	= 0.02	5.72	= 0.17	0.34	= 0.01
		Frugivore (fruit)	24	= 0.71	1.44	= 0.04	11.4	= 0.34	0.69	= 0.02

Effect metrics (mg a.i./kg BW per day)		Food guild (food item)	Maximum nomogram residues				Mean nomogram residues			
			On-field		Off-field drift: 6%		On-field		Off-field drift: 6%	
			EDE (mg a.i./kg bw)	RQ	EDE (mg a.i./kg bw)	RQ	EDE (mg a.i./kg bw)	RQ	EDE (mg a.i./kg bw)	RQ
		Herbivore (short grass)	172	**= 5**	10.3	= 0.3	60.9	**= 1.8**	3.66	= 0.11
		Herbivore (long grass)	105	**= 3.1**	6.29	= 0.18	34.2	**= 1**	2.05	= 0.06
		Herbivore (Broadleaf plants)	159	**= 4.7**	9.52	= 0.28	52.5	**= 1.5**	3.15	= 0.09
Large-sized mammal (1 kg)										
Reproduction azoxystrobin, Norway rat (*Rattus norvegicus*) NOAEL/1	34	Insectivore	42.7	**= 1.3**	2.56	= 0.08	29.5	= 0.87	1.77	= 0.05
		Granivore (grain and seeds)	6.61	= 0.19	0.4	= 0.01	3.15	= 0.09	0.19	< 0.01
		Frugivore (fruit)	13.2	= 0.39	0.79	= 0.02	6.3	= 0.19	0.38	= 0.01
		Herbivore (short grass)	94.5	**= 2.8**	5.67	= 0.17	33.5	= 0.99	2.01	= 0.06
		Herbivore (long grass)	57.7	**= 1.7**	3.46	= 0.1	18.8	= 0.55	1.13	= 0.03
		Herbivore (Broadleaf plants)	87.4	**= 2.6**	5.24	= 0.15	28.9	= 0.85	1.73	= 0.05

Bolded values indicate an exceedance of the level of concern (LOC).

Table 5.1.14 Azoxystrobin screening level risk to birds and mammals from early airblast use on highbush blueberries (2 × 75 g a.i./ha)

Organism	Exposure	Effect metrics (µg a.i./kg soil; g a.i./ha)	Screening EEC (µg a.i./kg soil; g a.i./ha)	Screening RQ	Screening LOC Exceeded?	Drift EEC (µg a.i./kg soil; g a.i./ha)	Drift RQ	Drift LOC exceeded?
Terrestrial Invertebrates								
Earthworm (*Eisenia fetida*)	56-d chronic	NOEC/1 = 3000	65.4	= 0.02	No	48.4	= 0.02	No
oilseed rape and carrot (*Brassica napus*	8-d seedling emergence	ER_{25}/1 = 661	147.1	= 0.22	No	108.8	= 0.16	No

and *Daucus carota*)								
oilseed rape (*Brassica napa*)	21-d Vegetative vigour	ER_{25}/1 > 168	121.2	< 0.72	No	89.7	< 0.53	No

Bird and Mammal

Organism	Study type	Effect metrics (mg a.i./kg BW per day)	Food Guild	Estimated daily intake (assuming high residue levels on food, mg a.i./kg BW per day)	Screening assessment RQs	LOC exceeded?
Northern bobwhite (*Colinus virginianus*)	Acute	LD_{50}/10 > 213	Small insectivore birds	9.82	< 0.05	No
			Medium insectivore birds	7.72	< 0.04	No
			Large herbivore birds	4.98	< 0.02	No
Canary (*Serinus canaria*)	Acute	LD_{50}/10 > 200	Small insectivore birds	9.82	< 0.05	No
			Medium insectivore birds	7.72	< 0.04	No
			Large herbivore birds	4.98	< 0.02	No
Northern bobwhite (*Colinus virginianus*)	Dietary	LD_{50}/10 > 117.9	Small insectivore birds	9.82	< 0.08	No
			Medium insectivore birds	7.72	< 0.07	No
			Large herbivore birds	4.98	< 0.04	No
Mallard (*Anas platyrhynchos*)	Dietary	LD_{50}/10 > 376.4	Small insectivore birds	9.82	< 0.03	No
			Medium insectivore birds	7.72	< 0.02	No
			Large herbivore birds	4.98	< 0.01	No
Northern bobwhite (*Colinus virginianus*)	Reproduction	NOAEL/1 = 117	Small insectivore birds	9.82	= 0.08	No
			Medium insectivore birds	7.72	= 0.07	No

			Large herbivore birds	4.98	= 0.04	No
Mallard (*Anas platyrhynchos*)	Reproduction	NOAEL/1 = 175	Small insectivore birds	9.82	= 0.06	No
			Medium insectivore birds	7.72	= 0.04	No
			Large herbivore birds	4.98	= 0.03	No
Norway rat (*Rattus norvegicus*)	Acute	LD_{50}/10 > 500	Small insectivore mammals	5.61	< 0.01	No
			Medium herbivore mammals	10.7	< 0.02	No
			Large herbivore mammals	5.88	< 0.01	No
Norway rat (*Rattus norvegicus*)	Reproduction	NOAEL/1 = 34	Small insectivore mammals	5.61	= 0.17	No
			Medium herbivore mammals	10.7	= 0.31	No
			Large herbivore mammals	5.88	= 0.17	No

Table 5.1.15 Azoxystrobin screening level risk to birds and mammals from late airblast use on highbush blueberries (2 × 75 g a.i./ha)

Organism	Exposure	Effect metrics (µg a.i./Kg soil; g a.i./ha)	Screening EEC (µg a.i./Kg soil; g a.i./ha)	Screening RQ	Screening LOC exceeded?	Drift EEC (µg a.i./kg soil; g a.i./ha)	Drift RQ	Drift LOC exceeded?
Terrestrial invertebrates								
Earthworm (*Eisenia fetida*)	56-d chronic	NOEC/1 = 3000	65.4	= 0.02	No	38.6	= 0.01	No
Oilseed rape and carrot (*Brassica napus* and *Daucus carota*)	8-d seedling emergence	ER_{25}/1 = 661	147.1	= 0.22	No	86.8	= 0.13	No
Oilseed rape (*Brassica napa*)	21-d Vegetative vigour	ER_{25}/1 > 168	121.2	< 0.72	No	71.5	< 0.43	No
Bird and mammal								

Organism	Study type	Effect metrics (mg a.i./kg BW per day)	Food guild	Estimated daily intake (assuming high residue levels on food, mg a.i./kg BW per day)	Screening assessment RQs	LOC exceeded?
Northern bobwhite (*Colinus virginianus*)	Acute	LD_{50}/10 > 213	Small insectivore birds	9.82	< 0.05	No
			Medium insectivore birds	7.72	< 0.04	No
			Large herbivore mammals	4.98	< 0.02	No
Canary (*Serinus canaria*)	Acute	LD_{50}/10 > 200	Small insectivore birds	9.82	< 0.05	No
			Medium insectivore birds	7.72	< 0.04	No
			Large herbivore mammals	4.98	< 0.02	No
Northern bobwhite (*Colinus virginianus*)	Dietary	LD_{50}/10 > 117.9	Small insectivore birds	9.82	< 0.08	No
			Medium insectivore birds	7.72	< 0.07	No
			Large herbivore mammals	4.98	< 0.04	No
Mallard (*Anas platyrhynchos*)	Dietary	LD_{50}/10 > 376.4	Small insectivore birds	9.82	< 0.03	No
			Medium insectivore birds	7.72	< 0.02	No
			Large herbivore mammals	4.98	< 0.01	No
Northern bobwhite (*Colinus virginianus*)	Reproduction	NOAEL/1 = 117	Small insectivore birds	9.82	= 0.08	No
			Medium insectivore birds	7.72	= 0.07	No
			Large herbivore mammals	4.98	= 0.04	No
Mallard (*Anas platyrhynchos*)	Reproduction	NOAEL/1 = 175	Small insectivore birds	9.82	= 0.06	No

			Medium insectivore birds	7.72	= 0.04	No
			Large herbivore mammals	4.98	= 0.03	No
Norway rat (*Rattus norvegicus*)	Acute	$LD_{50}/10 > 500$	Small insectivore mammals	5.61	< 0.01	No
			Medium insectivore birds	10.7	< 0.02	No
			Large herbivore mammals	5.88	< 0.01	No
Norway rat (*Rattus norvegicus*)	Reproduction	NOAEL/1 = 34	Small insectivore mammals	5.61	= 0.17	No
			Medium insectivore birds	10.7	= 0.31	No
			Large herbivore mammals	5.88	= 0.17	No

Table 5.1.16 Screening and drift risk to terrestrial organisms from early airblast use on filberts (3 × 225 g a.i./ha)

Organism	Exposure	Effect metrics (µg a.i./Kg soil; g a.i./ha)	Screening EEC (µg a.i./Kg soil; g a.i./ha)	Screening RQ	Screening LOC exceeded?	Drift EEC (µg a.i./kg soil; g a.i./ha)	Drift RQ	Drift LOC exceeded?
Terrestrial invertebrates								
Earthworm (*Eisenia fetida*)	56-d chronic	NOEC/1 = 3000	363.4	= 0.12	No	268.9	= 0.09	No
Oilseed rape and carrot (*Brassica napus* and *Daucus carota*)	8-d seedling emergence	ER_{25}/1 = 661	817.6	**= 1.2**	**Yes**	605.0	= 0.92	No
Oilseed rape (*Brassica napa*)	21-d Vegetative vigour	ER_{25}/1 > 168	415.7	**< 2.5**	**Yes**	307.6	**< 1.8**	**Yes**

Bird and mammal

Organism	Study type	Effect metrics (mg a.i./kg BW per day)	Food guild	Estimated daily intake (assuming high residue levels on food, mg a.i./kg BW per day)	Screening assessment RQs	LOC exceeded?
Northern bobwhite (*Colinus virginianus*)	Acute	LD_{50}/10 > 213	Small insectivore birds	33.7	< 0.16	No
			Medium insectivore birds	26.5	< 0.12	No
			Large herbivore birds	17.1	< 0.08	No
Canary (*Serinus canaria*)	Acute	LD_{50}/10 > 200	Small insectivore birds	33.7	< 0.17	No
			Medium insectivore birds	26.5	< 0.13	No
			Large herbivore birds	17.1	< 0.09	No
Northern bobwhite (*Colinus*	Dietary	LD_{50}/10 > 117.9	Small insectivore birds	33.7	< 0.29	No

virginianus)						
			Medium insectivore birds	26.5	< 0.22	No
			Large herbivore birds	17.1	< 0.14	No
Mallard (*Anas platyrhynchos*)	Dietary	LD_{50}/10 > 376.4	Small insectivore birds	33.7	< 0.09	No
			Medium insectivore birds	26.5	< 0.07	No
			Large herbivore birds	17.1	< 0.05	No
Northern bobwhite (*Colinus virginianus*)	Reproduction	NOAEL/1 = 117	Small insectivore birds	33.7	= 0.29	No
			Medium insectivore birds	26.5	= 0.23	No
			Large herbivore birds	17.1	= 0.15	No
Mallard (*Anas platyrhynchos*)	Reproduction	NOAEL/1 = 175	Small insectivore birds	33.7	= 0.19	No
			Medium insectivore birds	26.5	= 0.15	No
			Large herbivore birds	17.1	= 0.1	No
Norway rat (*Rattus norvegicus*)	Acute	LD_{50}/10 > 500	Small insectivore mammals	19.3	< 0.04	No
			Medium herbivore mammals	36.6	< 0.07	No
			Large herbivore mammals	20.2	< 0.04	No
Norway rat (*Rattus norvegicus*)	Reproduction	NOAEL/1 = 34	Small insectivore mammals	19.3	**= 0.57**	**Yes**
			Medium herbivore mammals	36.6	**= 1.1**	**Yes**
			Large herbivore mammals	20.2	= 0.59	No

Bolded values indicate an exceedance of the level of concern (LOC).

Table 5.1.17 Screening and drift risk to terrestrial organisms from late airblast use on filberts (3 × 225 g a.i./ha)

Organism	Exposure	Effect metrics (µg a.i./Kg soil; g a.i./ha)	Screening EEC (µg a.i./kg soil; g a.i./ha)	Screening RQ	Screening LOC exceeded?	Drift EEC (µg a.i./Kg soil; g a.i./ha)	Drift RQ	Drift LOC exceeded?
Terrestrial invertebrates								
Earthworm (*Eisenia fetida*)	56-d chronic	NOEC/1 = 3000	363.4	= 0.12	No	214.4	= 0.07	No
Oilseed rape and carrot (*Brassica napus* and *Daucus carota*)	8-d seedling emergence	ER_{25}/1 = 661	817.6	**= 1.2**	**Yes**	482.4	= 0.73	No
Oilseed rape (*Brassica napa*)	21-d Vegetative vigour	ER_{25}/1 > 168	415.7	**< 2.5**	**Yes**	245.3	**< 1.5**	**Yes**

Bird and mammal

Organism	Study type	Effect metrics (mg a.i./kg BW per day)	Food guild	Estimated daily intake (assuming high residue levels on food, mg a.i./kg BW per day)	Screening assessment RQs	LOC exceeded?
Northern bobwhite (*Colinus virginianus*)	Acute	LD_{50}/10 > 213	Small insectivore birds	33.7	< 0.16	No
			Medium insectivore birds	26.5	< 0.12	No
			Large herbivore birds	17.1	< 0.08	No
Canary (*Serinus canaria*)	Acute	LD_{50}/10 > 200	Small insectivore birds	33.7	< 0.17	No
			Medium insectivore birds	26.5	< 0.13	No
			Large herbivore birds	17.1	< 0.09	No
Northern bobwhite (*Colinus virginianus*)	Dietary	LD_{50}/10 > 117.9	Small insectivore birds	33.7	< 0.29	No
			Medium insectivore birds	26.5	< 0.22	No
			Large herbivore birds	17.1	< 0.14	No
Mallard (*Anas platyrhynchos*)	Dietary	LD_{50}/10 > 376.4	Small insectivore birds	33.7	< 0.09	No
			Medium insectivore birds	26.5	< 0.07	No
			Large herbivore birds	17.1	< 0.05	No
Northern bobwhite (*Colinus virginianus*)	Reproduction	NOAEL/1 = 117	Small insectivore birds	33.7	= 0.29	No
			Medium insectivore birds	26.5	= 0.23	No
			Large herbivore birds	17.1	= 0.15	No
Mallard (*Anas platyrhynchos*)	Reproduction	NOAEL/1 = 175	Small insectivore birds	33.7	= 0.19	No
			Medium insectivore birds	26.5	= 0.15	No
			Large herbivore birds	17.1	= 0.1	No

Norway rat (*Rattus norvegicus*)	Acute	LD_{50}/10 > 500	Small insectivore mammals	19.3	< 0.04	No
			Medium herbivore mammals	36.6	< 0.07	No
			Large herbivore mammals	20.2	< 0.04	No
Norway rat (*Rattus norvegicus*)	Reproduction	NOAEL/1 = 34	Small insectivore mammals	19.3	= 0.57	No
			Medium herbivore mammals	36.6	**= 1.1**	**Yes**
			Large herbivore mammals	20.2	= 0.59	No

Bolded values indicate an exceedance of the level of concern (LOC).

Table 5.1.18 Refined risk assessment for reproductive risks to medium sized mammals from early airblast application to filberts

Toxicity (mg a.i./kg BW per day)		**Food guild (food item)**	**Maximum nomogram residues**				**Mean nomogram residues**			
			On-field		**Off-field drift: 74%**		**On-field**		**Off-field drift: 74%**	
			EDE (mg a.i./kg bw)	**RQ**	**EDE (mg a.i./kg bw)**	**RQ**	**EDE (mg a.i./kg bw)**	**RQ**	**EDE (mg a.i./kg bw)**	**RQ**
Medium-sized mammal (0.035 kg)										
Reproduction azoxystrobin, Norway rat (Rattus norvegicus) NOAEL/1	34	Herbivore (short grass)	36.6	**= 1.1**	27.1	= 0.8	13	= 0.38	9.63	= 0.28
		Herbivore (Broadleaf plants)	33.9	**= 1**	25.1	= 0.74	11.2	= 0.33	8.29	= 0.24

Bolded values indicate an exceedance of the level of concern (LOC).

Table 5.1.19 Refined risk assessment for reproductive risks to medium sized mammals from late airblast application to filberts

Toxicity (mg a.i./kg BW per day)		Food Guild (food item)	Maximum nomogram residues				Mean nomogram residues			
			On-field		Off-field drift: 59%		On-field		Off-field drift: 59%	
			EDE (mg a..i/kg bw)	RQ	EDE (mg a.i./kg bw)	RQ	EDE (mg a.i./kg bw)	RQ	EDE (mg a.i./kg bw)	RQ
Medium Sized Mammal (0.035 kg)										
Reproduction azoxystrobin, Norway rat (Rattus norvegicus) NOAEL/1	34	Herbivore (short grass)	36.6	**= 1.1**	21.6	= 0.64	13	= 0.38	7.68	= 0.23
		Herbivore (Broadleaf plants)	33.9	**= 1**	20	= 0.59	11.2	= 0.33	6.61	= 0.19

Bolded values indicate an exceedance of the level of concern (LOC).

Table 5.1.20 Screening and drift risk to birds and mammals from aerial use on canola (1 × 75 a.i./ha)

Organism	Study type	Endpoint value (mg a.i./kg BW per day)	Food guild	Estimated daily intake (assuming high residue levels on food, mg a.i./kg BW per day)	Screening assessment RQs	LOC exceeded?
Northern bobwhite (*Colinus virginianus*)	Acute	LD_{50}/10 > 213	Small insectivore birds	6.08	< 0.03	No
			Medium insectivore birds	4.78	< 0.02	No
			Large herbivore birds	3.08	< 0.01	No
House finch (*Carpodacus mexicanus*)	Acute	LD_{50}/10 > 200	Small insectivore birds	6.08	< 0.03	No
			Medium insectivore birds	4.78	< 0.02	No
			Large herbivore birds	3.08	< 0.02	No
Northern bobwhite (*Colinus virginianus*)	Dietary	LD_{50}/10 > 117.9	Small insectivore birds	6.08	< 0.05	No
			Medium insectivore birds	4.78	< 0.04	No
			Large herbivore birds	3.08	< 0.03	No
Mallard (*Anas platyrhynchos*)	Dietary	LD_{50}/10 > 376.4	Small insectivore birds	6.08	< 0.02	No
			Medium insectivore birds	4.78	< 0.01	No
			Large herbivore birds	3.08	< 0.01	No
Northern bobwhite (*Colinus*	Reprodu ction	NOAEL/1 = 117	Small insectivore birds	6.08	0.05	No
			Medium insectivore birds	4.78	= 0.04	No

Organism	Study type	Endpoint value (mg a.i./kg BW per day)	Food guild	Estimated daily intake (assuming high residue levels on food, mg a.i./kg BW per day)	Screening assessment RQs	LOC exceeded?
virginianus)			Large herbivore birds	3.08	= 0.03	No
Mallard (*Anas platyrhynchos*)	Reproduction	NOAEL/1 = 175	Small insectivore birds	6.08	0.03	No
			Medium insectivore birds	4.78	= 0.03	No
			Large herbivore birds	3.08	= 0.02	No
Norway rat (*Rattus norvegicus*)	Acute	LD_{50}/10 > 500	Small insectivore mammals	3.47	< 0.01	No
			Medium herbivore mammals	6.61	< 0.01	No
			Large herbivore mammals	3.64	< 0.01	No
Norway rat (*Rattus norvegicus*)	Reproduction	NOAEL/1 = 34	Small insectivore mammals	3.47	0.1	No
			Medium herbivore mammals	6.61	= 0.19	No
			Large herbivore mammals	3.64	= 0.11	No

Table 5.1.21 Screening and drift risk to birds and mammals from aerial use on potato (3 × 200 g a.i./ha)

Organism	Study type	Endpoint value (mg a.i./kg BW per day)	Food guild	Estimated daily intake (assuming high residue levels on food, mg a.i./kg BW per day)	Screening assessment RQs	LOC exceeded?
Northern bobwhite (*Colinus virginianus*)	Acute	LD_{50}/10 > 213	Small insectivore birds	32.3	< 0.15	No
			Medium insectivore birds	25.4	< 0.12	No
			Large herbivore birds	16.4	< 0.08	No
Canary (*Serinus canaria*)	Acute	LD_{50}/10 > 200	Small insectivore birds	32.3	< 0.16	No
			Medium insectivore birds	25.4	< 0.13	No
			Large herbivore birds	16.4	< 0.08	No
Northern bobwhite (*Colinus virginianus*)	Dietary	LD_{50}/10 > 117.9	Small insectivore birds	32.3	< 0.27	No
			Medium insectivore birds	25.4	< 0.22	No
			Large herbivore birds	16.4	< 0.14	No
Mallard (*Anas platyrhynchos*)	Dietary	LD_{50}/10 > 376.4	Small insectivore birds	32.3	< 0.09	No
			Medium insectivore birds	25.4	< 0.07	No
			Large herbivore birds	16.4	< 0.04	No
Northern bobwhite (*Colinus virginianus*)	Reproduction	NOAEL/1 = 117	Small insectivore birds	32.3	0.28	No
			Medium insectivore birds	25.4	= 0.22	No
			Large herbivore birds	16.4	= 0.14	No
Mallard (*Anas*	Reprodu	NOAEL/1 = 175	Small insectivore birds	32.3	0.18	No

Organism	Study type	Endpoint value (mg a.i./kg BW per day)	Food guild	Estimated daily intake (assuming high residue levels on food, mg a.i./kg BW per day)	Screening assessment RQs	LOC exceeded?
platyrhynchos)	ction		Medium insectivore birds	25.4	= 0.15	No
			Large herbivore birds	16.4	= 0.09	No
Norway rat (*Rattus norvegicus*)	Acute	LD_{50}/10 > 500	Small insectivore mammals	18.5	< 0.04	No
			Medium herbivore mammals	35.2	< 0.07	No
			Large herbivore mammals	19.4	< 0.04	No
Norway rat (*Rattus norvegicus*)	Reproduction	NOAEL/1 = 34	Small insectivore mammals	18.5	0.54	No
			Medium herbivore mammals	35.2	**= 1**	**Yes**
			Large herbivore mammals	19.4	= 0.57	No

Bolded values indicate an exceedance of the level of concern (LOC).

Table 5.1.22 Refined risk to medium herbivore mammals to azoxystrobin from aerial use on potatoes (3 × 200 g a.i./ha)

Toxicity (mg a.i./kg BW per day)		Food Guild (food item)	Maximum nomogram residues				Mean nomogram residues			
			On-field		Off-field drift: 23%		On-field		Off-field drift: 23%	
			EDE (mg a.i./kg bw)	RQ	EDE (mg a.i./kg bw)	RQ	EDE (mg a.i./kg bw)	RQ	EDE (mg a.i./kg bw)	RQ
Medium-sized mammal (0.035 kg)										
Reproduction azoxystrobin, Norway rat (*Rattus norvegicus*) NOAEL/1	34	Herbivore (short grass)	**35.2**	**= 1**	8.09	= 0.24	12.5	= 0.37	2.87	= 0.08

Bolded values indicate an exceedance of the level of concern (LOC).

Table 5.1.23 Screening risk to birds and mammals associated with use on sunflower seeds as seed treatment (24.5 g a.i./100 kg seed)

Study type	Study endpoint (mg a.i./kg bw/day / UF)	EDE (mg a.i./kg bw/day)	RQ
Small bird (0.02 kg)			
Acute	200.00	64.754	0.3
Reproduction	117.00	64.754	0.6
Medium bird (0.10 kg)			
Acute	200.00	50.865	0.3
Reproduction	117.00	50.865	0.4
Large bird (1.00 kg)			
Acute	200.00	14.829	0.1
Reproduction	117.00	14.829	0.1
Small mammals (0.015 kg)			
Acute	500.00	37.005	0.1
Reproduction	32.00	37.005	**1.2**
Medium mammals (0.035 kg)			
Acute	500.00	31.825	0.1
Reproduction	32.00	31.825	**1.0**
Large mammals (1.00 kg)			
Acute	500.00	17.523	0.0
Reproduction	32.00	17.523	0.5

Bolded values indicate an exceedance of the level of concern (LOC).

Table 5.1.24 Refined risk to small mammals associated with use on sunflower seeds as seed treatment (24.5 g a.i./100 kg seed)

Study Endpoint (mg a.i./kg bw/day / UF)		EDE (mg a.i./kg bw/day)	RQ	Number of seeds needed to reach endpoint		Area required (m^2)			
						No Drilling		Precision drilling	
				Min	Max	min	max	Min	max
Small mammals (0.015 kg)									
Acute	500.00	37.005	0.1	168.07	168.07	32.68	32.68	6535.95	6535.95
Reproduction	34.00	37.005	**1.2**	10.76	10.76	2.09	2.09	418.30	418.30

Bolded values indicate an exceedance of the level of concern (LOC).

Table 5.1.25 Screening risk assessment from azoxystrobin in-furrow application to radish (1 × 1500 g a.i./ha) to birds and mammals

Organism	Study type	Effect metrics (mg a.i./kg BW per day)	Food guild	Estimated daily intake (assuming high residue levels on food, mg a.i./kg BW per day)	Screening assessment RQs	LOC exceeded?
Northern bobwhite (*Colinus virginianus*)	Acute	$LD_{50}/10 > 213$	Small insectivore birds	12	< 0.5	No
			Medium insectivore birds	95.5	< 0.45	No
			Large herbivore birds	61.6	< 0.29	No
Canary (*Serinus canaria*)	Acute	$LD_{50}/10 > 200$	Small insectivore birds	122	< 0.61	No
			Medium insectivore birds	95.5	< 0.48	No
			Large herbivore birds	61.6	< 0.31	No
Northern bobwhite (*Colinus virginianus*)	Dietary	$LD_{50}/10 > 117.9$	Small insectivore birds	**122**	**< 1**	**Yes**
			Medium insectivore birds	95.5	< 0.81	No
			Large herbivore birds	61.6	< 0.52	No
Mallard (*Anas platyrhynchos*)	Dietary	$LD_{50}/10 > 376.4$	Small insectivore birds	122	< 0.32	No
			Medium insectivore birds	95.5	< 0.25	No
			Large herbivore birds	61.6	< 0.16	No
Northern bobwhite (*Colinus virginianus*)	Reproduction	NOAEL/1 = 117	Small insectivore birds	122	**1**	**Yes**
			Medium insectivore birds	95.5	= 0.82	No
			Large herbivore birds	61.6	= 0.53	No
Mallard (*Anas platyrhynchos*)	Reproduction	NOAEL/1 = 175	Small insectivore birds	122	0.69	No

Organism	Study type	Effect metrics (mg a.i./kg BW per day)	Food guild	Estimated daily intake (assuming high residue levels on food, mg a.i./kg BW per day)	Screening assessment RQs	LOC exceeded?
			Medium insectivore birds	95.5	= 0.55	No
			Large herbivore birds	61.6	= 0.35	No
Norway rat (*Rattus norvegicus*)	Acute	LD_{50}/10 > 500	Small insectivore mammals	69.5	< 0.14	No
			Medium herbivore mammals	132	< 0.26	No
			Large herbivore mammals	72.8	< 0.15	No
Norway rat (*Rattus norvegicus*)	Reproduction	NOAEL/1 = 34	Small insectivore mammals	69.5	**2**	**Yes**
			Medium herbivore mammals	132	**= 3.9**	**Yes**
			Large herbivore mammals	72.8	**= 2.1**	**Yes**

Bolded values indicate an exceedance of the level of concern (LOC).

Table 5.1.26 Refined risk to birds and mammals from in-furrow application to radish

Toxicity (mg a.i./kg BW per day)		Food guild (food item)	Maximum nomogram residues				Mean nomogram residues			
			On-field		Off-field		On-field		Off-field	
			EDE (mg a.i./kg bw)	RQ	EDE (mg a.i./kg bw)	RQ	EDE (mg a.i./kg bw)	RQ	EDE (mg a.i./kg bw)	RQ
Small Bird (0.02 kg) Reproduction azoxystrobin, Northern bobwhite (*Colinus virginianus*) NOAEL/1	117	Insectivore	**112**	**1**	7.3	0.06	84	0.72	5.04	0.04
Small Mammal (0.015 kg) Reproduction azoxystrobin, Norway rate (*Rattus norvegicus*) NOAEL/1	34	Insectivore	**69.5**	**2**	4.17	0.12	**48**	**1.4**	2.88	0.08

Toxicity (mg a.i./kg BW per day)		Food guild (food item)	Maximum nomogram residues				Mean nomogram residues			
			On-field		Off-field		On-field		Off-field	
			EDE (mg a.i./kg bw)	RQ	EDE (mg a.i./kg bw)	RQ	EDE (mg a.i./kg bw)	RQ	EDE (mg a.i./kg bw)	RQ
Medium Mammal (0.035 kg) Reproduction azoxystrobin, Norway rate (*Rattus norvegicus*) NOAEL/1	34	Insectivore	**59.8**	**1.8**	3.59	0.11	**41.3**	**1.2**	2.48	0.07
		Herbivore (short grass)	**132**	**3.9**	7.93	0.23	**47**	**1.4**	2.82	0.08
		Herbivore (long grass)	**80.7**	**2.4**	4.84	0.14	26.4	0.78	1.58	0.05
		Herbivore (Broadleaf plants)	**122**	**3.6**	7.34	0.22	**40.4**	**1.2**	2.43	0.07
Large Mammal (1 kg) Reproduction azoxystrobin, Norway rat (*Rattus norvegicus*) NOAEL/1	34	Herbivore (short grass)	**72.8**	**2.1**	4.37	0.13	25.9	0.76	1.55	0.05
		Herbivore (long grass)	**44.4**	**1.3**	2.67	0.08	14.5	0.43	0.87	0.03
		Herbivore (Broadleaf plants)	**67.4**	**2**	4.04	0.12	22.3	0.65	1.34	0.04

Bolded values indicate an exceedance of the level of concern (LOC).

5.2 Aquatic risk assessment

Table 5.2.1 Screening and drift risk to aquatic organsims associated with azoxystrobin use on turf (with snow mould) applied by field sprayer with medium-spray droplet size (6% drift)

Organism	Exposure	Effect metrics (mg a.i./L)	Screening EEC (mg a.i./L)	RQ	Screening LOC exceeded?	Drift EEC (mg a.i./L)	Drift RQ	Drift LOC exceeded?
Water flea (*Daphnia magna*)	Acute 48-h static	$EC_{50}/2$ = 0.14	0.311	**2.2**	**Yes**	0.0186	0.13	No
Water flea (*Daphnia magna*)	Chronic 21-d static	NOEC/1 = 0.044	0.311	**7.1**	**Yes**	0.0186	0.42	No
Harlequin fly (*Chironomus riparius*)	Chronic 28-d static	NOEC/1 = 0.8	0.311	0.39	No	0.0186	0.02	No
Copepod (*Macrocyclops fuscus*)	Acute 48-h static	$EC_{50}/2$ = 0.065	0.311	**4.8**	**Yes**	0.0186	0.29	No
Rainbow trout (*Oncorhynchus mykiss*)	Acute 96-h flow-through	$LC_{50}/10$ = 0.047	0.311	**6.6**	**Yes**	0.0186	0.4	No
Bluegill sunfish (*Lepomis macrochirus*)	Acute 96-h flow-through	$LC_{50}/10$ = 0.11	0.311	**2.8**	**Yes**	0.0186	0.17	No
Fathead minnow	Chronic 30-d flow-	NOEC/1 = 0.147	0.311	**2.1**	**Yes**	0.0186	0.13	No

Organism	Exposure	Effect metrics (mg a.i./L)	Screening EEC (mg a.i./L)	RQ	Screening LOC exceeded?	Drift EEC (mg a.i./L)	Drift RQ	Drift LOC exceeded?
(*Pimephales promelas*)	through							
Freshwater diatom (*Navicula pelliculosa*)	Acute 5-d static	$EC_{50}/2$ = 0.007	0.311	**44**	**Yes**	0.0186	**2.7**	**Yes**
Duckweed (*Lemna gibba*)	Acute 14-d static-renewal	$EC_{50}/2$ = 1.6	0.311	0.19	No	0.0186	0.01	No
Frog (*Rana temporaria*)	Acute 96-h static	$LC_{50}/10$ = 0.03	1.656	**52**	**Yes**	0.0994	**3.1**	**Yes**
Mysid shrimp (*Americamysis bahia*, reported as *Mysidopsis bahia*)	Acute 96-h static	$EC_{50}/2$ = 0.0275	0.311	**11**	**Yes**	0.0144	0.52	No
Mysid shrimp (*Americamysis bahia*, reported as *Mysidopsis bahia*)	Chronic 28-d flow-through	NOEC/1 = 0.00954	0.311	**33**	**Yes**	0.0144	**1.5**	**Yes**
Sheepshead Minnow (*Cyprinodon variegatus*)	Acute 96-h static	$LC_{50}/10$ = 0.066	0.311	**4.7**	**Yes**	0.0144	0.22	No
Diatom (*Skeletonema costatum*)	Acute 72-h static	$EC_{50}/2$ = 0.049	0.311	**6.3**	**Yes**	0.0144	0.29	No
Fathead minnow (*Pimephales promelas*) as surrogate for amphibians	Chronic 30-d flow-through	NOEC/1 = 0.147	1.656	**11**	**Yes**	0.0994	0.68	No

Bolded values indicate an exceedance of the level of concern (LOC).

Table 5.2.2 Screening and drift risk to aquatic organisms associated with azoxystrobin on canola (1 × 75 g a.i./ha) applied by field sprayer with medium-spray droplet size (6% drift)

Organism	Exposure	Effect metrics (mg a.i./L)	Screening EEC (mg a.i./L)	RQ	Screening LOC exceeded?	Drift EEC (mg a.i./L)	Drift RQ	Drift LOC exceeded?
Water flea (*Daphnia magna*)	Acute 48-h static	$EC_{50}/2$ = 0.14	0.009	0.07	No	0.0006	< 0.01	No
Water flea (*Daphnia magna*)	Chronic 21-d static	NOEC/1 = 0.044	0.009	0.21	No	0.0006	0.01	No
Harlequin fly (*Chironomus	Chronic 28-d static	NOEC/1 = 0.8	0.009	0.01	No	0.0006	< 0.01	No

Organism	Exposure	Effect metrics (mg a.i./L)	Screening EEC (mg a.i./L)	RQ	Screening LOC exceeded?	Drift EEC (mg a.i./L)	Drift RQ	Drift LOC exceeded?
riparius)								
Copepod (*Macrocyclops fuscus*)	Acute 48-h static	$EC_{50}/2$ = 0.065	0.009	0.14	No	0.0006	< 0.01	No
Rainbow trout (*Oncorhynchus mykiss*)	Acute 96-h flow-through	$LC_{50}/10$ = 0.047	0.009	0.2	No	0.0006	0.01	No
Bluegill sunfish (*Lepomis macrochirus*)	Acute 96-h flow-through	$LC_{50}/10$ = 0.11	0.009	0.09	No	0.0006	< 0.01	No
Fathead minnow (*Pimephales promelas*)	Chronic 30-d flow-through	NOEC/1 = 0.147	0.009	0.06	No	0.0006	< 0.01	No
Freshwater diatom (*Navicula pelliculosa*)	Acute 5-d static	$EC_{50}/2$ = 0.007	0.009	**1.3**	**Yes**	0.0006	0.08	No
Duckweed (*Lemna gibba*)	Acute 14-d static-renewal	$EC_{50}/2$ = 1.6	0.009	< 0.01	No	0.0006	< 0.01	No
Common frog (*Rana temporaria*)	Acute 96-h static	$LC_{50}/10$ = 0.032	0.050	**1.6**	**Yes**	0.0030	0.09	No
Mysid shrimp (*Americamysis bahia*, reported as *Mysidopsis bahia*)	Acute 96-h static	$EC_{50}/2$ = 0.0275	0.009	0.34	No	0.0006	0.02	No
Mysid shrimp (*Americamysis bahia*, reported as *Mysidopsis bahia*)	Chronic 28-d flow-through	NOEC/1 = 0.00954	0.009	0.98	No	0.0006	0.06	No
Sheepshead Minnow (*Cyprinodon variegatus*)	Acute 96-h static	$LC_{50}/10$ = 0.066	0.009	0.14	No	0.0006	< 0.01	No
Diatom (*Skeletonema costatum*)	Acute 72-h static	$EC_{50}/2$ = 0.049	0.009	0.19	No	0.0006	0.01	No
Fathead minnow (*Pimephales promelas)* as surrogate for amphibians	Chronic 30-d flow-through	NOEC/1=0.147	0.050	0.34	No	0.003	0.02	No

Bolded values indicate an exceedance of the level of concern (LOC).

Table 5.2.3 Screening and drift risk to aquatic organisms associated with azoxystrobin on canola (2 × 250 g a.i./ha) applied by field sprayer with medium-spray droplet size (6% drift)

Organism	Exposure	Endpoint value (µg a.i./L)	Screening EEC (µg a.i./L)	RQ	Screening LOC exceeded?	Drift EEC (µg a.i./L)	Drift RQ	Drift LOC exceeded?
Water flea (*Daphnia magna*)	Acute 48-h static	$EC_{50}/2$ = 140	62.21	= 0.44	No	3.73	= 0.03	No
Water flea (*Daphnia magna*)	Chronic 21-d static	NOEC/1 = 44	62.21	**= 1.4**	**Yes**	3.73	= 0.08	No
Copepod (*Macrocyclops fuscus*)	Acute 48-h static	$EC_{50}/2$ = 65	62.21	= 0.96	No	3.73	= 0.06	No
Harlequin fly (*Chironomus riparius*)	Chronic 28-d static	NOEC/1 = 800	62.21	= 0.08	No	3.73	< 0.01	No
Rainbow trout (*Oncorhynchus mykiss*)	Acute 96-h flow-through	$LC_{50}/10$ = 47	62.21	**= 1.3**	**Yes**	3.73	= 0.08	No
Bluegill sunfish (*Lepomis macrochirus*)	Acute 96-h flow-through	$LC_{50}/10$ = 110	62.21	= 0.57	No	3.73	= 0.03	No
Fathead minnow (*Pimephales promelas*)	Chronic 30-d flow-through	NOEC/1 = 147	62.21	= 0.42	No	3.73	= 0.03	No
Freshwater diatom (*Navicula pelliculos*a)	Acute 5-d static	$EC_{50}/2$ = 7	62.21	**= 8.9**	**Yes**	3.73	= 0.53	No
Duckweed (*Lemna gibba*)	Acute 14-d static-renewal	$EC_{50}/2$ = 1600	62.21	= 0.04	No	3.73	< 0.01	No
Fathead minnow (*Pimephales promelas*) as surrogate for amphibians	Chronic 30-d flow-through	NOEC/1 = 147	331.76	**= 2.3**	**Yes**	19.91	= 0.14	No
common frog (*Rana temporaria*)	Acute 96-h static	$LC_{50}/10$ = 32	331.76	**= 10**	**Yes**	19.91	= 0.62	No
Mysid shrimp (*Americamysis bahia*, reported as *Mysidopsis bahia*)	Acute 96-h static	$EC_{50}/2$ = 27.5	62.21	**= 2.3**	**Yes**	1.88	= 0.07	No
Mysid shrimp (*Americamysis bahia*, reported as *Mysidopsis bahia*)	Chronic 28-d flow-through	NOEC/1 = 9.54	62.21	**= 6.5**	**Yes**	1.88	= 0.2	No
Sheepshead Minnow (*Cyprinodon variegatus*)	Acute 96-h static	$LC_{50}/10$ = 66	62.21	= 0.94	No	1.88	= 0.03	No
Diatom (*Skeletonema costatum*)	Acute 72-h static	$EC_{50}/2$ = 49	62.21	**= 1.3**	**Yes**	1.88	= 0.04	No

Bolded values indicate an exceedance of the level of concern (LOC).

Table 5.2.4 Screening and drift risk to aquatic organisms from early airblast use on highbush blueberries (2 × 75 g a.i./ha)

Organism	Exposure	Effect metrics (µg a.i./L)	Screening EEC (µg a.i./L)	RQ	Screening LOC exceeded?	Drift EEC (µg a.i./L)	Drift RQ	Drift LOC exceeded?
Water flea (*Daphnia magna*)	Acute 48-h static	EC_{50}/2 = 140	18.6	= 0.13	No	13.7	= 0.1	No
Water flea (*Daphnia magna*)	Chronic 21-d static	NOEC/1 = 44	18.6	= 0.42	No	13.7	= 0.31	No
Copepod (*Macrocyclops fuscus*)	Acute 48-h static	EC_{50}/2 = 65	18.6	= 0.29	No	13.7	= 0.21	No
Harlequin fly (*Chironomus riparius*)	Chronic 28-d static	NOEC/1 = 800	18.6	= 0.02	No	13.7	= 0.02	No
Rainbow trout (*Oncorhynchus mykiss*)	Acute 96-h flow-through	LC_{50}/10 = 47	18.6	= 0.39	No	13.7	= 0.29	No
Bluegill sunfish (*Lepomis macrochirus*)	Acute 96-h flow-through	LC_{50}/10 = 110	18.6	= 0.17	No	13.7	= 0.12	No
Fathead minnow (*Pimephales promelas*)	Chronic 30-d flow-through	NOEC/1 = 147	18.6	= 0.13	No	13.7	= 0.09	No
Freshwater diatom (*Navicula pelliculosa*)	Acute 5-d static	EC_{50}/2 = 7	18.6	**= 2.7**	**Yes**	13.7	**= 2**	**Yes**
Duckweed (*Lemna gibba*)	Acute 14-d static-renewal	EC_{50}/2 = 1600	18.6	= 0.01	No	13.7	< 0.01	No
Fathead minnow (*Pimephales promelas*) as surrogate for amphibians	Chronic 30-d flow-through	NOEC/1 = 147	99.0	= 0.67	No	73.2	= 0.5	No
Common frog (*Rana temporaria*)	Acute 96-h static	LC_{50}/10 = 32	99.0	**= 3.1**	**Yes**	73.2	**= 2.3**	**Yes**
Mysid shrimp (*Americamysis bahia*, reported as *Mysidopsis bahia*)	Acute 96-h static	EC_{50}/2 = 27.5	18.6	= 0.67	No	6.9	= 0.25	No
Mysid shrimp (*Americamysis bahia*, reported as *Mysidopsis bahia*)	Chronic 28-d flow-through	NOEC/1 = 9.54	18.6	**= 1.9**	**Yes**	6.9	= 0.73	No
Sheepshead Minnow (*Cyprinodon variegatus*)	Acute 96-h static	LC_{50}/10 = 66	18.6	= 0.28	No	6.9	= 0.11	No
Diatom (*Skeletonema costatum*)	Acute 72-h static	EC_{50}/2 = 49	18.6	= 0.38	No	6.9	= 0.14	No

Bolded values indicate an exceedance of the level of concern (LOC).

Table 5.2.5 Screening and drift risk to aquatic organisms from late airblast use on highbush blueberries (2 × 75 g a.i./ha)

Organism	Exposure	Effect metrics (µg a.i./L)	Screening EEC (µg a.i./L)	RQ	Screening LOC exceeded?	Drift EEC (µg a.i./L)	Drift RQ	Drift LOC exceeded?
Water flea (*Daphnia magna*)	Acute 48-h static	$EC_{50}/2$ = 140	18.6	= 0.13	No	10.9	= 0.08	No
Water flea (*Daphnia magna*)	Chronic 21-d static	NOEC/1 = 44	18.6	= 0.42	No	10.9	= 0.25	No
Copepod (*Macrocyclops fuscus*)	Acute 48-h static	$EC_{50}/2$ = 65	18.6	= 0.29	No	10.9	= 0.17	No
Harlequin fly (*Chironomus riparius*)	Chronic 28-d static	NOEC/1 = 800	18.6	= 0.02	No	10.9	= 0.01	No
Rainbow trout (*Oncorhynchus mykiss*)	Acute 96-h flow-through	$LC_{50}/10$ = 47	18.6	= 0.39	No	10.9	= 0.23	No
Bluegill sunfish (*Lepomis macrochirus*)	Acute 96-h flow-through	$LC_{50}/10$ = 110	18.6	= 0.17	No	10.9	= 0.1	No
Fathead minnow (*Pimephales promelas*)	Chronic 30-d flow-through	NOEC/1 = 147	18.6	= 0.13	No	10.9	= 0.07	No
Freshwater diatom (*Navicula pelliculosa*)	Acute 5-d static	$EC_{50}/2$ = 7	18.6	**= 2.7**	**Yes**	10.9	**= 1.6**	**Yes**
Duckweed (*Lemna gibba*)	Acute 14-d static-renewal	$EC_{50}/2$ = 1600	18.6	= 0.01	No	10.9	< 0.01	No
Fathead minnow (*Pimephales promelas*) as surrogate for amphibians	Chronic 30-d flow-through	NOEC/1 = 147	99.0	= 0.67	No	58.4	= 0.4	No
Common frog (*Rana temporaria*)	Acute 96-h static	$LC_{50}/10$ = 32	99.0	**= 3.1**	**Yes**	58.4	**= 1.8**	**Yes**
Mysid shrimp (*Americamysis bahia*, reported as *Mysidopsis bahia*)	Acute 96-h static	$EC_{50}/2$ = 27.5	18.6	= 0.67	No	5.5	= 0.2	No
Mysid shrimp (*Americamysis bahia*, reported as *Mysidopsis bahia*)	Chronic 28-d flow-through	NOEC/1 = 9.54	18.6	**= 1.9**	**Yes**	5.5	= 0.58	No
Sheepshead Minnow (*Cyprinodon variegatus*)	Acute 96-h static	$LC_{50}/10$ = 66	18.6	= 0.28	No	5.5	= 0.08	No
Diatom (*Skeletonema costatum*)	Acute 72-h static	$EC_{50}/2$ = 49	18.6	= 0.38	No	5.5	= 0.11	No

Bolded values indicate an exceedance of the level of concern (LOC).

Table 5.2.6 Screening and drift risk to aquatic organisms from early airblast use on filberts (3 × 225 g a.i./ha)

Organism	Exposure	Effect metrics (µg a.i./L)	Screening EEC (µg a.i./L)	RQ	Screening LOC exceeded?	Drift EEC (µg a.i./L)	Drift RQ	Drift LOC exceeded?
Water flea (*Daphnia magna*)	Acute 48-h static	EC_{50}/2 = 140	106.9609	= 0.76	No	79.15105	= 0.57	No
Water flea (*Daphnia magna*)	Chronic 21-d static	NOEC/1 = 44	106.9609	**= 2.4**	**Yes**	79.15105	**= 1.8**	**Yes**
Copepod (*Macrocyclops fuscus*)	Acute 48-h static	EC_{50}/2 = 65	106.9609	**= 1.6**	**Yes**	79.15105	**= 1.2**	**Yes**
Harlequin fly (*Chironomus riparius*)	Chronic 28-d static	NOEC/1 = 800	106.9609	= 0.13	No	79.15105	= 0.1	No
Rainbow trout (*Oncorhynchus mykiss*)	Acute 96-h flow-through	LC_{50}/10 = 47	106.9609	**= 2.3**	**Yes**	79.15105	**= 1.7**	**Yes**
Bluegill sunfish (*Lepomis macrochirus*)	Acute 96-h flow-through	LC_{50}/10 = 110	106.9609	= 0.97	No	79.15105	= 0.72	No
Fathead minnow (*Pimephales promelas*)	Chronic 30-d flow-through	NOEC/1 = 147	106.9609	= 0.73	No	79.15105	= 0.54	No
Freshwater diatom (*Navicula pelliculosa*)	Acute 5-d static	EC_{50}/2 = 7	106.9609	**= 15**	**Yes**	79.15105	**= 11**	**Yes**
Duckweed (*Lemna gibba*)	Acute 14-d static-renewal	EC_{50}/2 = 1600	106.9609	= 0.07	No	79.15105	= 0.05	No
Fathead minnow (*Pimephales promelas*) as surrogate for amphibians	Chronic 30-d flow-through	NOEC/1 = 147	570.458	**= 3.9**	**Yes**	422.1389	**= 2.9**	**Yes**
Common frog (*Rana temporaria*)	Acute 96-h static	LC_{50}/10 = 32	570.458	**= 18**	**Yes**	422.1389	**= 13**	**Yes**
Mysid shrimp (*Americamysis bahia*, reported as *Mysidopsis bahia*)	Acute 96-h static	EC_{50}/2 = 27.5	106.9609	**= 3.9**	**Yes**	20.8125	= 0.76	No
Mysid shrimp (*Americamysis bahia*, reported as *Mysidopsis bahia*)	Chronic 28-d flow-through	NOEC/1 = 9.54	106.9609	**= 11**	**Yes**	20.8125	**= 2.2**	**Yes**
Sheepshead Minnow (*Cyprinodon variegatus*)	Acute 96-h static	LC_{50}/10 = 66	106.9609	**= 1.6**	**Yes**	20.8125	= 0.32	No
Diatom (*Skeletonema costatum*)	Acute 72-h static	EC_{50}/2 = 49	106.9609	**= 2.2**	**Yes**	20.8125	= 0.42	No

Bolded values indicate an exceedance of the level of concern (LOC).

Table 5.2.7 Screening and drift risk to aquatic organisms from late airblast use on filberts (3 × 225 g a.i./ha)

Organism	Exposure	Effect metrics (µg a.i./L)	Screening EEC (µg a.i./L)	RQ	Screening LOC exceeded?	Drift EEC (µg a.i./L)	Drift RQ	Drift LOC exceeded?
Water flea (*Daphnia magna*)	Acute 48-h static	$EC_{50}/2$ = 140	106.9609	= 0.76	No	63.10692	= 0.45	No
Water flea (*Daphnia magna*)	Chronic 21-d static	NOEC/1 = 44	106.9609	**= 2.4**	**Yes**	63.10692	**= 1.4**	**Yes**
Copepod (*Macrocyclops fuscus*)	Acute 48-h static	$EC_{50}/2$ = 65	106.9609	**= 1.6**	**Yes**	63.10692	= 0.97	No
Harlequin fly (*Chironomus riparius*)	Chronic 28-d static	NOEC/1 = 800	106.9609	= 0.13	No	63.10692	= 0.08	No
Rainbow trout (*Oncorhynchus mykiss*)	Acute 96-h flow-through	$LC_{50}/10$ = 47	106.9609	**= 2.3**	**Yes**	63.10692	**= 1.3**	**Yes**
Bluegill sunfish (*Lepomis macrochirus*)	Acute 96-h flow-through	$LC_{50}/10$ = 110	106.9609	= 0.97	No	63.10692	= 0.57	No
Fathead minnow (*Pimephales promelas*)	Chronic 30-d flow-through	NOEC/1 = 147	106.9609	= 0.73	No	63.10692	= 0.43	No
Freshwater diatom (*Navicula pelliculosa*)	Acute 5-d static	$EC_{50}/2$ = 7	106.9609	**= 15**	**Yes**	63.10692	**= 9**	**Yes**
Duckweed (*Lemna gibba)*	Acute 14-d static-renewal	$EC_{50}/2$ = 1600	106.9609	= 0.07	No	63.10692	= 0.04	No
Fathead minnow (*Pimephales promelas*) as surrogate for amphibians	Chronic 30-d flow-through	NOEC/1 = 147	570.458	**= 3.9**	**Yes**	336.5702	**= 2.3**	**Yes**
Common frog (*Rana temporaria*)	Acute 96-h static	$LC_{50}/10$ = 32	570.458	**= 18**	**Yes**	336.5702	**= 11**	**Yes**
Mysid shrimp (*Americamysis bahia*, reported as *Mysidopsis bahia*)	Acute 96-h static	$EC_{50}/2$ = 27.5	106.9609	**= 3.9**	**Yes**	16.59375	= 0.6	No
Mysid shrimp (*Americamysis bahia*, reported as *Mysidopsis bahia*)	Chronic 28-d flow-through	NOEC/1 = 9.54	106.9609	**= 11**	**Yes**	16.59375	**= 1.7**	**Yes**
Sheepshead Minnow (*Cyprinodon variegatus*)	Acute 96-h static	$LC_{50}/10$ = 66	106.9609	**= 1.6**	**Yes**	16.59375	= 0.25	No
Diatom (*Skeletonema costatum*)	Acute 72-h static	$EC_{50}/2$ = 49	106.9609	**= 2.2**	**Yes**	16.59375	= 0.34	No

Bolded values indicate an exceedance of the level of concern (LOC).

Table 5.2.8 Screening and drift risk to aquatic organisms associated with potato application (3 × 200 g a.i./ha) applied by aerial equipment with a medium spray droplet size (23% drift)

Organism	Exposure	Endpoint Value (µg a.i./L)	Screening EEC (µg a.i./L)	RQ	Screening LOC Exceeded?	Drift EEC (µg a.i./L)	Drift RQ	Drift LOC Exceeded?
Water flea (*Daphnia magna*)	Acute 48-h static	$EC_{50}/2$ = 140	73.48	= 0.52	No	16.90	= 0.12	No
Water flea (*Daphnia magna*)	Chronic 21-d static	NOEC/1 = 44	73.48	**= 1.7**	**Yes**	16.90	= 0.38	No
Copepod (*Macrocyclops fuscus*)	Acute 48-h static	$EC_{50}/2$ = 65	73.48	**= 1.1**	**Yes**	16.90	= 0.26	No
Harlequin fly (*Chironomus riparius*)	Chronic 28-d static	NOEC/1 = 800	73.48	= 0.09	No	16.90	= 0.02	No
Rainbow trout (*Oncorhynchus mykiss*)	Acute 96-h flow-through	$LC_{50}/10$ = 47	73.48	**= 1.6**	**Yes**	16.90	= 0.36	No
Bluegill sunfish (*Lepomis macrochirus*)	Acute 96-h flow-through	$LC_{50}/10$ = 110	73.48	= 0.67	No	16.90	= 0.15	No
Fathead minnow (*Pimephales promelas*)	Chronic 30-d flow-through	NOEC/1 = 147	73.48	= 0.5	No	16.90	= 0.11	No
Freshwater diatom (*Navicula pelliculosa*)	Acute 5-d static	$EC_{50}/2$ = 7	73.48	**= 10**	**Yes**	16.90	**= 2.4**	**Yes**
Duckweed (*Lemna gibba*)	Acute 14-d static-renewal	$EC_{50}/2$ = 1600	73.48	= 0.05	No	16.90	= 0.01	No
Fathead minnow (*Pimephales promelas*) as surrogate for amphibians	Chronic 30-d flow-through	NOEC/1 = 147	391.92	**= 2.7**	**Yes**	90.14	= 0.61	No
Common frog (*Rana temporaria*)	Acute 96-h static	$LC_{50}/10$ = 32	391.92	**= 12**	**Yes**	90.14	**= 2.8**	**Yes**
Mysid shrimp (*Americamysis bahia*, reported as *Mysidopsis bahia*)	Acute 96-h static	$EC_{50}/2$ = 27.5	391.92	**= 2.7**	**Yes**	90.14	= 0.21	No
Mysid shrimp (*Americamysis bahia*, reported as *Mysidopsis bahia*)	Chronic 28-d flow-through	NOEC/1 = 9.54	73.48	**= 7.7**	**Yes**	5.75	= 0.6	No
Sheepshead Minnow (*Cyprinodon variegatus*)	Acute 96-h static	$LC_{50}/10$ = 66	73.48	**= 1.1**	**Yes**	5.75	= 0.09	No
Diatom (*Skeletonema costatum*)	Acute 72-h static	$EC_{50}/2$ = 49	73.48	**= 1.5**	**Yes**	5.75	= 0.12	No

Bolded values indicate an exceedance of the level of concern (LOC).

Table 5.2.9 Screening and drift risk to aquatic organisms associated with use on canola/cereals (1 × 75 g a.i./ha) applied by aerial equipment with a medium spray droplet size (23% drift)

Organism	Exposure	Effect metrics (mg a.i./L)	Screening EEC (mg a.i./L)	RQ	Screening LOC exceeded?	Drift EEC (mg a.i./L)	Drift RQ	Drift LOC exceeded?
Water flea (*Daphnia magna*)	Acute 48-h static	$EC_{50}/2$ = 0.14	0.009	0.07	No	0.0022	0.02	No
Water flea (*Daphnia magna*)	Chronic 21-d static	NOEC/1 = 0.044	0.009	0.21	No	0.0022	0.05	No
Harlequin fly (*Chironomus riparius*)	Chronic 28-d static	NOEC/1 = 0.8	0.009	0.01	No	0.0022	< 0.01	No
Copepod (*Macrocyclops fuscus*)	Acute 48-h static	$EC_{50}/2$ = 0.065	0.009	0.14	No	0.0022	0.03	No
Rainbow trout (*Oncorhynchus mykiss*)	Acute 96-h flow-through	$LC_{50}/10$ = 0.047	0.009	0.2	No	0.0022	0.05	No
Bluegill sunfish (*Lepomis macrochirus*)	Acute 96-h flow-through	$LC_{50}/10$ = 0.11	0.009	0.09	No	0.0022	0.02	No
Fathead minnow (*Pimephales promelas*)	Chronic 30-d flow-through	NOEC/1 = 0.147	0.009	0.06	No	0.0022	0.01	No
Freshwater diatom (*Navicula pelliculosa*)	Acute 5-d static	$EC_{50}/2$ = 0.007	0.009	**1.3**	**Yes**	0.0022	0.31	No
Duckweed (*Lemna gibba*)	Acute 14-d static-renewal	$EC_{50}/2$ = 1.6	0.009	< 0.01	No	0.0022	< 0.01	No
Frog (*Rana temporaria*)	Acute 96-h static	$LC_{50}/10$ = 0.032	0.050	**1.6**	**Yes**	0.0115	0.36	No
Mysid shrimp (*Mysidopsis bahia*)	Acute 96-h static	$EC_{50}/2$ = 0.0275	0.009	0.34	No	0.0022	0.08	No
Mysid shrimp (*Mysidopsis bahia*)	Chronic 28-d flow-through	NOEC/1 = 0.00954	0.009	0.94	No	0.0022	0.23	No
Sheepshead Minnow (*Cyprinodon variegatus*)	Acute 96-h static	$LC_{50}/10$ = 0.066	0.009	0.14	No	0.0022	0.03	No
Diatom (*Skeletonema costatum*)	Acute 72-h static	$EC_{50}/2$ = 0.049	0.009	0.19	No	0.0022	0.04	No
Fathead minnow (*Pimephales promelas*) as surrogate for amphibians	Chronic 30-d flow-through	NOEC/1 = 0.147	0.050	0.34	No	0.0115	0.08	No

Bolded values indicate an exceedance of the level of concern (LOC).

Table 5.2.10 Refined risk to aquatic organsims from use on canola (2 × 250 g a.i./ha) based on ecoscenario modelling estimated environmental concentrations

Organism	Exposure	Effect metrics (ug a.i./L	Runoff EEC (µg a.i./L)	Runoff RQ	Runoff LOC exceeded?
Water flea (*Daphnia magna*)	Chronic 21-d static	NOEC/1 = 44	8.7	0.20	No
Rainbow trout (*Oncorhynchus mykiss*)	Acute 96-h flow-through	LC_{50}/10 = 47	10	0.21	No
Freshwater diatom (*Navicula pelliculosa*)	Acute 5-d static	EC_{50}/2 = 7	6.3	0.9	No
Common frog (*Rana temporaria*)	Acute 96-h static	LC_{50}/10 = 32	35.4	**1.1**	**Yes**
Fathead minnow (*Pimephales promelas*) as surrogate for amphibians	Chronic 30-d flow-through	NOEC/1 = 147	8.7	0.06	No
Mysid shrimp (*Americamysis bahia*, reported as *Mysidopsis bahia*)	Acute 96-h static	EC_{50}/2 = 27.5	8.7	0.32	No
Diatom (*Skeletonema costatum*)	Acute 72-h static	EC_{50}/2 = 49	10.4	0.21	No

Bolded values indicate an exceedance of the level of concern (LOC).

Table 5.2.11 Refined risk to aquatic horganisms from use on turf (snow mould) based on ecosenario modelling estimated enviornmental concentrations

Organism	Exposure	Effect metrics (µg a.i./L)	Runoff EEC (µg a.i./L)	Runoff RQ	Runoff LOC exceeded?
Water flea (*Daphnia magna*)	Acute 48-h static	140	38.8	0.3	No
Water flea (*Daphnia magna*)	Chronic 21-d static	44	33.2	0.8	No
Copepod (*Macrocyclops fuscus*)	Acute 48-h static	65	38.8	0.6	No
Rainbow trout (*Oncorhynchus mykiss*)	Acute 96-h flow-through	47	37.7	0.8	No
Bluegill sunfish (*Lepomis macrochirus*)	Acute 96-h flow-through	110	37.7	0.3	No
Fathead minnow (*Pimephales promelas*)	Chronic 30-d flow-through	147	33.2	0.2	No
Freshwater diatom (*Navicula pelliculosa*)	Acute 5-d static	7	26.5	**3.8**	**Yes**
Fathead minnow (*Pimephales promelas*) as surrogate for amphibians	Chronic 30-d flow-through	147	74.5	0.5	No
Common frog (*Rana temporaria*)	Acute 96-h static	30	122	**4.1**	**Yes**
Mysid shrimp (*Americamysis bahia*, reported as *Mysidopsis bahia*)	Acute 96-h static	27.5	37.7	**1.4**	**Yes**

Organism	Exposure	Effect metrics (µg a.i./L)	Runoff EEC (µg a.i./L)	Runoff RQ	Runoff LOC exceeded?
Sheepshead Minnow (*Cyprinodon variegatus*)	Acute 96-h static	66	37.7	0.6	No
Diatom (*Skeletonema costatum*)	Acute 72-h static	49	38.8	0.8	No

Bolded values indicate an exceedance of the level of concern (LOC).

Table 5.2.12 Scenarios conducted with acute azoxystrobin endpoint for *Navicula pelliculosa* $EbC_{50}/2$ = 0.007 mg a.i./L

No.	Scenario short description	No. fields	Soil to water (%)	Floodwater EEC (µg/L)	Floodwater RQ	Receiving water EEC (µg/L)	Receiving water RQ
1	10 fields; 50% transfer from water to soil	10	50%	517	**74**	52	**7**
2	10 fields; 25% transfer from water to soil	10	25%	258	**37**	26	**4**
3	5 fields; 50% transfer from water to soil	**5**	50%	270	**39**	27	**4**
4	5 fields; 25% transfer from water to soil	5	25%	135	**19**	13	**2**

Note: The representative half-lives at 20°C were adjusted daily to Vancouver mean temperatures, ranging between 4.1°C and 18°C. The beginning of wet-harvest (flooding) was set to 21 September, with an interval of 5 days between fields. Treatment date was set 50 days prior to harvest, as per current label requirements. The floodwater depth was modelled at 0.6 m. The reported EECs and RQs are calculated two weeks after the beginning of the last harvest. Bolded cells are changes from the base (first) scenario listed.

Table 5.2.13 Refined scenario conducted with acute azoxystrobin endpoint for *Navicula pelliculosa* $EbC_{50}/2$ = 0.007 mg a.i./L

No.	Scenario short description	Floodwater EEC (µg a.i./L)	Floodwater RQ	Receiving water EEC (µg a.i./L)	Receiving water RQ
5	10 fields;	33.3	**4.8**	3.33	0.5

Bolded value indicates an exceedance of the level of concern (LOC).

6 Pest Control Product Policy considerations

Table 6.1 Toxic substance management policy considerations – comparison to TSMP Track 1 criteria

TSMP Track 1 Criteria	TSMP Track 1 Criterion value		Active ingredient endpoints	Transformation product R234888 (Compound 2)
CEPA toxic or CEPA toxic equivalent[1]	Yes		Yes	NA
Predominantly anthropogenic[2]	Yes		Yes	Yes
Persistence[3]:	Soil	Half-life ≥ 182 days	148 days	23.7–56.5 days

TSMP Track 1 Criteria	TSMP Track 1 Criterion value		Active ingredient endpoints	Transformation product R234888 (Compound 2)
	Water	Half-life ≥ 182 days	199 days	NA
	Sediment	Half-life ≥ 365 days	stable	NA
	Air	Half-life ≥ 2 days or evidence of long range transport	Half-life or volatilization is not an important route of dissipation and long-range atmospheric transport is unlikely to occur based on the vapour pressure (1.1×10^{-10} Pa at 20°C) and Henry's law constant (7.4×10^{-9} Pa m^3/mol).	NA
Bioaccumulation[4]	Log $K_{ow} \geq 5$		2.5	NA
	BCF ≥ 5000		Value not available	NA
	BAF ≥ 5000		Value not available	NA
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] No major transformation products were detected in lab or field studies.

[2] 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).

[3] 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.

[4] 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.

[5] 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}).

Appendix IX Proposed label amendment for products containing azoxystrobin

Information on labels of currently registered products should not be removed unless it contradicts the following label statements.

Label amendments for azoxystrobin technical products

ENVIRONMENTAL PRECAUTIONS

> "TOXIC to aquatic organisms."
>
> "**DO NOT** discharge effluent containing this product into sewer systems, lakes, streams, ponds, estuaries, oceans or other waters."

DISPOSAL

> "Canadian manufacturers should dispose of unwanted active ingredients and containers in accordance with municipal and provincial regulations. For additional details and clean up of spills, contact the manufacturer and the provincial regulatory agency."

Label amendments for azoxystrobin end-use products:

PRECAUTIONS

1. Restricted-entry interval (REI)

Add the following statement on the commercial-class product labels (Reg. Nos. 28394, 30489, 31050 and 33349):

> "**DO NOT** enter or allow worker entry into treated areas during the restricted entry interval (REI) of 12 hours."

Add the following statement on the commercial-class product label (Reg. No. 32905):

> "For daylilies, **DO NOT** enter or allow worker entry into treated areas during the restricted entry interval (REI) of 12 hours."

Replace the following restriction statement on commercial-class product label (Reg. Nos. 26155):

> "**DO NOT** re-enter treated turf until residues have dried."

With:

> "For golf courses, **DO NOT** enter or allow entry into treated areas until sprays have dried."
>
> "For daylilies, **DO NOT** enter or allow worker entry into treated areas during the restricted entry interval (REI) of 12 hours."

Replace the following restriction statement on commercial-class product label (Reg. Nos. 30254):

> "**DO NOT** re-enter treated fields until residues have dried."

With:

> "**DO NOT** enter or allow worker entry into treated areas during the restricted entry interval (REI) of 12 hours."

2. Greenhouse restriction

The following greenhouse statement is required on product labels (Reg. Nos 28393 and 31523):

> "**DO NOT** apply using handheld mist blower/airblast or handheld fogging equipment."

3. Drift statement

The following labels (Reg. Nos. 26153, 26155, 28232, 28328, 28393, 28394, 29295, 29871, 30254, 30388, 30489, 31523, 31973, 23905, 33349, 33798, 33807, 34408) need to amend/add the standard drift statement:

> "Apply only when the potential for drift beyond the area to be treated is minimal. Take into consideration wind speed, wind direction, temperature inversions, application equipment, and sprayer settings."

Seed treatment labels

Principal display panel

For products registered for on-farm treatment:

> "KEEP [END-USE PRODUCT NAME] OUT OF REACH OF CHILDREN."

For products registered for commercial treatment or commercial and on-farm treatment:

> "KEEP TREATED SEED OUT OF REACH OF CHILDREN AND ANIMALS."

For corn, canola, soybean and dry beans*,* commercial seed treatment (facilities and mobile treaters) with closed transfer, including closed mixing, loading, calibrating, and closed treatment equipment only is permitted. No open transfer is permitted.

For dry beans, on-farm seed treatment (open transfer including open mixing, loading, calibrating, and open treatment equipment) is permitted

Precautions:

Seed types	Tasks	PPE/Engineering controls
Commercial seed treatment (including facility workers and mobile treaters)		
Corn	Treating/Application, bagging, sewing, stacking, forklift operation, cleaning and repairing	Closed transfer only. Closed transfer includes closed mixing, loading, calibrating and closed treatment. No open transfer is permitted. During all activities, wear a long-sleeved shirt, long pants, chemical-resistant glove, socks and shoes. Chemical-resistant gloves are not required during bagging/sewing/stacking and forklift operation.
Canola, Soybean, Dry Bean	Treating/Application, Bagging, Sewing, Stacking, Forklift Operation, Cleaning and Repairing	Closed transfer only. Closed transfer includes closed mixing, loading, calibrating and closed treatment. No open transfer is permitted. During all activities, wear coveralls over a long-sleeved shirt, long pants, chemical-resistant gloves, socks and shoes.
On-farm seed treatment		
Dry Bean	All tasks	Open or closed transfer. During mixing, loading, treating, calibrating, cleaning and repairing, wear a long-sleeved shirt, long pants, chemical-resistant gloves, socks and shoes.
For planting and handling treated seeds		
All Seed Types	Planting	During handling and planting of treated seeds, wear a long-sleeved shirt, long pants, chemical-resistant gloves, socks and shoes. Gloves are not required within a closed cab.

"Apply only in a way that this product will not contact workers or other persons, either directly or through drift. Only workers wearing personal protective equipment may be in the area where treating, bagging, sewing and/or stacking is occurring."

"**DO NOT** use treated seed for food, feed or oil processing."

"**DO NOT** use in hopper-box, planter-box, slurry-box or other non-commercial seed treatment applications at, or immediately before, planting."

"**DO NOT** plant treated seed by hand."

For products registered for on farm treatment:

"KEEP [END-USE PRODUCT NAME] OUT OF REACH OF CHILDREN."

For products registered for commercial treatment or commercial and on-farm treatment:

"KEEP TREATED SEED OUT OF REACH OF CHILDREN AND ANIMALS."

Imported treated seed information:

"**DO NOT** treat sunflower and vegetables (cucurbit, fruiting, leafy, brassica leafy, bulb and root) seeds in Canada."

For seed tags:

"Keep treated seed out of reach of children and animals."

"During handling and planting of treated seeds, wear a long-sleeved shirt, long pants, chemical-resistant gloves, socks, and shoes."

"**DO NOT** plant seed by hand."

DIRECTIONS FOR USE

1. Label clarification

Replace the following statement to commercial-class product labels (Reg. Nos. 28328 and 32878):

"Apply at the first of disease in the spout year."

With:

"Apply at the first sign of disease in the sprout year."

2. Application interval

Add the following to commercial-class product labels (Reg. Nos. 28328, 30256, 32184, 32878) for barley, rye and wheat uses:

"Application Interval (days): 21-28"

3. Residential turf restriction

Add the following statement to the commercial-class product label Reg. Nos. 29295 and 34229:

"**DO NOT** apply to turf in residential areas, including lawns, gardens, parks, playing fields, cemeteries, and schools."

Replace the following restriction statement on commercial-class product labels (Reg. Nos. 26155, 28393 and 32905):

"Residential use is restricted."

With:

"**DO NOT** apply to turf in residential areas, including lawns, gardens, parks, playing fields, cemeteries, and schools."

4. Crop rotation

Rotational crops	Planting time from last application
All crops listed on this label	Immediately
All cereal crops not listed on this label	45 days
All other crops intended for food and feed	30 days

ENVIRONMENTAL PRECAUTIONS

"Toxic to birds and small wild mammals."

Or, if registsred for seed treatment, the following is required:

"All containers or packages containing treated seed for sale or use in Canada must be labelled or tagged as followed: Toxic to birds and small wild mammals. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned-up from the soil surface."

"Toxic to aquatic organisms and non-target terrestrial plants. Observe spray buffer zones specified under DIRECTIONS FOR USE."

"This product demonstrates the properties and characteristics associated with chemicals detected in groundwater. The use of this product in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination."

"To reduce runoff from treated areas into aquatic habitats avoid application to areas with a moderate to steep slope, compacted soil, or clay."

"Avoid application when heavy rain is forecast."

"Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative filter strip between the treated area and the edge of the water body."

DIRECTIONS FOR USE

"This product is not registered for the control of pests in aquatic systems, **DO NOT** use to control aquatic pests."

"**DO NOT** contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes."

For labels with greenhouse uses, the following is required:

> "**DO NOT** allow releases, effluent or runoff from greenhouses containing this procut to enter lakes, streams, ponds, or other waters."

For labels with Chemigation, the following is required:

> "**DO NOT** apply this product through any other type of irrigation system."
>
> "**DO NOT** apply when wind speed causes non-uniform distribution and/or favours drift beyond the area intended for treatment."
>
> "**DO NOT** apply by chemigation if the area to be treated is within 100 metres of a residential area or park."

Spray drift statements for products with spray application

Field sprayer application

For fine spray products:

Field sprayer application: "**DO NOT** apply during periods of dead calm. Avoid application of this product when winds are gusty. **DO NOT** apply with spray droplets smaller than the American Society of Agricultural Engineers (ASAE S572.1) fine classification. Boom height must be 60 cm or less above the crop or ground."

Or, for medium spray products:

Field sprayer application: "**DO NOT** apply during periods of dead calm. Avoid application of this product when winds are gusty. **DO NOT** apply with spray droplets smaller than the American Society of Agricultural Engineers (ASAE S572.1) medium classification. Boom height must be 60 cm or less above the crop or ground."

Airblast application

Airblast application: "**DO NOT** apply during periods of dead calm. Avoid application of this product when winds are gusty. **DO NOT** direct spray above plants to be treated. Turn off outward pointing nozzles at row ends and outer rows. **DO NOT** apply when wind speed is greater than 16 km/h at the application site as measured outside of the treatment area on the upwind side."

Chemigation

> "**DO NOT** apply through irrigation equipment."

Or

Chemigation: "**DO NOT** apply during periods of dead calm. Avoid application of this product when winds are gusty. **DO NOT** apply with spray droplets smaller than the American Society of Agricultural Engineers (ASAE S572.1) medium classification. Applications MUST be conducted WITHOUT the use of end guns."

Aerial application

> "**DO NOT** apply by air."

Or

Aerial application: "**DO NOT** apply during periods of dead calm. Avoid application of this product when winds are gusty. **DO NOT** apply when wind speed is greater than 16 km/h at flying height at the site of application. **DO NOT** apply with spray droplets smaller than the American Society of Agricultural Engineers (ASAE S572.1) medium classification. Reduce drift caused by turbulent wingtip vortices. Nozzle distribution along the spray boom length MUST NOT exceed 65% of the wing- or rotorspan."

> "Apply only by fixed-wing or rotary aircraft equipment which has been functionally and operationally calibrated for the atmospheric conditions of the area and the application rates and conditions of this label."

> "Label rates, conditions and precautions are product specific. Read and understand the entire label before opening this product. Apply only at the rate recommended for aerial application on this label. Where no rate for aerial application appears for the specific use, this product cannot be applied by any type of aerial equipment."

Ensure uniform application. To avoid streaked, uneven or overlapped application, use appropriate marking devices."

Use precautions

> "Apply only when meteorological conditions at the treatment site allow for complete and even crop coverage. Apply only under conditions of good practice specific to aerial application as outlined in the National Aerial Pesticide Application Manual, developed by the Federal/Provincial/Territorial Committee on Pest Management and Pesticides."

Product specific precautions

> "Read and understand the entire label before opening this product. If you have questions, call the manufacturer at (XXX)YYY-ZZZZ or obtain technical advice from the distributor or your provincial agricultural representative. Application of this specific product must meet and/or conform to the following:

Volume: Apply the recommended rate in a minimum spray volume of 45 litres per hectare."

Spray drift buffer zones

A spray buffer zone is NOT required for:

- uses with hand-held application equipment permitted on this label,
- low-clearance hooded or shielded sprayers that prevent spray contact with crop, fruit or foliage,
- soil drench or soil incorporation.

The spray buffer zones specified in the table below are required between the point of direct application and the closest downwind edge of sensitive terrestrial habitats (such as grasslands, forested areas, shelter belts, woodlots, hedgerows, riparian areas and shrublands), sensitive freshwater habitats (such as lakes, rivers, sloughs, ponds, prairie potholes, creeks, marshes, streams, reservoirs and wetlands) and estuarine/marine habitats.

Method of application*	Crop	Spray buffer zones (metres) required for the protection of:				
		Freshwater habitat of depths:		Estuarine/Marine habitat of depths:		Terrestrial habitat:
		Less than 1 m	Greater than 1 m	Less than 1 m	Greater than 1 m	
Fine spray (PCP numbers 33022, 33390, and 33391)						
Field sprayer	Cereals, bushberries, lowbush berries	1	0	0	0	0
	Corn	1	0	0	0	1
	Legumes	2	0	0	0	1
Medium spray (all other azoxystrobin PCPs)						
Field sprayer	Cereals, wheat, barley, lunaria, mustard seed, radish, Crop Group 20A, fescue, mint	1	0	0	0	0
	Lowbush blueberries, daylilies, corn, seed corn, field tomatoes, fruiting vegetables, ground cherries, legumes, dried shelled peas and beans including lentils, soybeans, peas and beans, sweet potatoes, cucurbit vegetables, brassica, artichoke, bulb vegetables, Crop subgroup 13-07G (excluding blueberry and cranberry), tobacco	1	0	0	0	1
	Canola, caraway, coriander, cumin, safflower, ginseng, spinach	1	0	1	0	1
	Potatoes	1	1	0	0	1

Method of application*	Crop		Spray buffer zones (metres) required for the protection of: Freshwater habitat of depths: Less than 1 m	Freshwater habitat of depths: Greater than 1 m	Estuarine/Marine habitat of depths: Less than 1 m	Estuarine/Marine habitat of depths: Greater than 1 m	Terrestrial habitat:
	Sugar beets, asparagus, cabbage, celery, parsley, cranberry, strawberry, carrot, outdoor ornamentals		1	1	1	0	1
	Turf (with snow mould)		2	1	1	1	1
	Turf (without snow mould)		3	1	1	1	1
Chemigation	Cranberries		1	1	1	0	1
Airblast	Bush berries	Early growth stage	3	0	0	0	0
		Late growth stage	2	0	0	0	0
	Highbush blueberries	Early growth stage	5	0	0	0	1
		Late growth stage	3	0	0	0	1
	Cranberries	Early growth stage	15	1	1	0	4
		Late growth stage	5	1	1	0	2
	Outdoor ornamentals	Early growth stage	15	1	1	0	3
		Late growth stage	5	1	1	0	2
	Hazelnuts/Filberts	Early growth stage	20	1	1	0	5
		Late growth stage	10	1	1	0	3

*Note for PRVD: These ground spray buffer zones are for azoxystrobin only. For PCP numbers 28328, 29295, 30256, 30518, 31050, 31074, 31126, 31523, 31524, 32015, 32184, 32878, 33022, 33390, 33391, and 33672, care must be taken to ensure the correct spray buffer zones appear on the product label after the final decision. These products are co-formulated with other active ingredients that may result in larger spray buffer zones. Until the re-evaluation of these co-formulants are completed, if spray buffer zones on the current label are larger than the ones for azoxystrobin, the labelled spray buffer zones should remain.

Method of application*	Crop	PCP#	Application method	Spray buffer zones (metres) required for the protection of: Freshwater habitat of depths: Less than 1 m	Freshwater habitat of depths: Greater than 1 m	Estuarine/Marine habitat of depths: Less than 1 m	Estuarine/Marine habitat of depths: Greater than 1 m	Terrestrial habitat:
Aerial	Canola	28328 32015 32878	Fixed wing	1	0	0	0	0
			Rotary wing	1	0	0	0	0
		33729 33807	Fixed wing	3	0	1	0	15
			Rotary wing	1	0	1	0	10
		26153 30254 32263	Fixed wing	4	0	1	0	15
			Rotary wing	1	0	1	0	10

Method of application*	Crop	PCP#	Application method	Spray buffer zones (metres) required for the protection of:				
				Freshwater habitat of depths:		Estuarine/Marine habitat of depths:		Terrestrial habitat:
				Less than 1 m	Greater than 1 m	Less than 1 m	Greater than 1 m	
		32416 32417 32418 34408						
	Cereals	26153	Fixed wing	1	0	0	0	0
		28328 30254 30256 30489 31074 31126 32184 32263 32416 32417 32418 32878 33022 33672 33729 33807 34408	Rotary wing	1	0	0	0	0
	Corn (all uses except Matador and Warrior tank mix)	26153	Fixed wing	1	0	0	0	0
		28328 30254 30256 31254 32184 32263 32416 32417 32418 32878 33022 33391 33807 34408	Rotary wing	1	0	0	0	0
	Corn (Matador or Warrior tank mix), seed corn	26153	Fixed wing	1	0	0	0	15
		30254 33729 33807	Rotary wing	1	0	0	0	10
		32263	Fixed wing	3	0	0	0	15
		32416 32417 32418 34408	Rotary wing	1	0	0	0	10
	Corn (Tilt tank mix)	33729	Fixed wing	5	0	0	0	15
			Rotary wing	3	0	0	0	10
	Legumes	28328	Fixed wing	1	0	0	0	15

Method of application*	Crop	PCP#	Application method	Spray buffer zones (metres) required for the protection of:				
				Freshwater habitat of depths:		Estuarine/Marine habitat of depths:		Terrestrial habitat:
				Less than 1 m	Greater than 1 m	Less than 1 m	Greater than 1 m	
		30256 32878 33729	Rotary wing	1	0	0	0	10
		26153	Fixed wing	3	0	0	0	15
		30254 31973 32263 32416 32417 32418 33022 33390 33391 33807 34408 34616	Rotary wing	1	0	0	0	10
	Field tomatoes	33807	Fixed wing	3	0	0	0	15
			Rotary wing	1	0	0	0	15
		26153	Fixed wing	10	0	0	0	15
		30254 32263 32416 32417 32418 33729 34408	Rotary wing	5	0	0	0	15
	Potatoes	26153	Fixed wing	10	1	0	0	15
		30254 30518 32263 32416 32417 32418 33729 33807 34408	Rotary wing	10	1	0	0	15
		32015	Fixed wing	4	0	0	0	15
			Rotary wing	1	0	0	0	10
		31524	Fixed wing	5	0	0	0	15
			Rotary wing	1	0	0	0	10
	Sweet potatoes	31524	Fixed wing	5	0	0	0	15
			Rotary wing	1	0	0	0	10
	Lowbush blueberries	33022 33391	Fixed wing	1	0	0	0	0
			Rotary wing	1	0	0	0	0
		28328 32878	Fixed wing	1	0	0	0	15
			Rotary wing	1	0	0	0	10
	Soybeans	32184	Fixed wing	1	0	0	0	15
			Rotary wing	1	0	0	0	10

Method of application*	Crop	PCP#	Application method	Spray buffer zones (metres) required for the protection of:				
				Freshwater habitat of depths:		Estuarine/Marine habitat of depths:		Terrestrial habitat:
				Less than 1 m	Greater than 1 m	Less than 1 m	Greater than 1 m	
		31524	Fixed wing	2	0	0	0	15
			Rotary wing	1	0	0	0	10
		31973	Fixed wing	3	0	0	0	15
			Rotary wing	1	0	0	0	10
		31126	Fixed wing	10	0	0	0	15
			Rotary wing	5	0	0	0	15
	Lentils	31126	Fixed wing	10	0	0	0	15
			Rotary wing	5	0	0	0	15
		32015	Fixed wing	4	0	0	0	15
			Rotary wing	1	0	0	0	10
	Dried shelled peas and beans	32184	Fixed wing	1	0	0	0	15
			Rotary wing	1	0	0	0	10
		31524	Fixed wing	2	0	0	0	15
			Rotary wing	1	0	0	0	10
		31973	Fixed wing	3	0	0	0	15
			Rotary wing	1	0	0	0	10
		32015	Fixed wing	4	0	0	0	15
			Rotary wing	1	0	0	0	10
		31126	Fixed wing	10	0	0	0	15
			Rotary wing	5	0	0	0	15
	Lunaria, mustard seed, radish, Crop Group 20A	32015	Fixed wing	1	0	0	0	0
			Rotary wing	1	0	0	0	0

*Note for PRVD: These aerial spray buffer zones are for azoxystrobin only. For PCP numbers 28328, 30256, 30518, 31074, 31126, 31524, 32015, 32184, 32878, 33022, 33390, 33391, and 33672, care must be taken to ensure the correct spray buffer zones appear on the product label after the final decision. These products are co-formulated with other active ingredients that may result in larger spray buffer zones. Until the re-evaluation of these co-formulants is completed, if spray buffer zones on the current label are larger than the ones for azoxystrobin, the labelled spray buffer zones should remain.

For tank mixes, consult the labels of the tank-mix partners and observe the largest (most restrictive) spray buffer zone of the products involved in the tank mixture and apply using the coarsest spray (ASAE) category indicated on the labels for those tank mix partners.

The spray buffer zones for this product can be modified based on weather conditions and spray equipment configuration by accessing the Spray Buffer Zone Calculator on the Pesticides portion of the Canada.ca website.

GINSENG

Aquatic buffer zones apply to ginseng.

> "Newly seeded gardens: A maximum of two applications to the crop between seeding and harvest of the crop. One application in the fall (September/October) of the first growing season; apply after seeding prior to straw mulch application. The second application in the following spring; apply over straw mulch (pre-emergence)."

Associated Application Limitations and Preharvest Interval Tables must be updated to 1 application per year (from 2 on current labels). In addition, include an asterisk for ginseng and a footnote stating only 2 applications are allowed between seeding and harvest.

TURF

"No more than one snow mould application per year."

References

A. Information considered in the updated chemistry assessment

Studies/information submitted by registrant

PMRA document number	Reference
1647087	Submission for Registration of ICIA5504 Technical; Active Ingredient; Names, Manufacturing Locations, Product Identity, Preliminary Analysis, Physico-Chemical, The Determination of ICIA5504, DACO: 2.1,2.10,2.11,2.12,2.13,2.14,2.2,2.3,2.4,2.5, 2.6,2.7,2.8,2.9
1647089	1995, Common Name: Azoxystrobin - ICIA5504: Detailed Analysis of Technical Materials Representative of Large Scale Production, DACO: 2.13
1889080	DACO 2.11.3 Detailed Production Process, DACO: 2.11.3
1889085	2009, Method validation for analysis of Azoxystrobin technical grade active ingredient (TGAI) and associated impurity, DACO: 2.13.1,2.13.2
1889087	2009, Analysis of representative production batches of Azoxystrobin technical grade active ingredient (TGAI) to determine %Azoxystrobin and to quantify its assocaited impurity, DACO: 2.13.3
1889088	2009, Method development, validation and determination in five representative production batches of Azoxystrobin technical grade active ingredient (TGAI) by HPLC, DACO: 2.13.3
1889091	2010, Appearance (Colour, Physical state and odour) of Azoxystrobin, DACO: 2.14.1,2.14.2,2.14.3
1889092	2010, Melting Point/Melting Range of Azoxystrobin, DACO: 2.14.4
1889094	2010, Specific Gravity of Azoxystrobin, DACO: 2.14.6
1889095	2010, Water Solubility of Azoxystrobin, DACO: 2.14.7
1889098	2010, Solubility of Azoxystrobin in Organic Solvents, DACO: 2.14.8
1889101	2010, Vapour Pressure of Azoxystrobin, DACO: 2.14.9
1889102	dissociation constant of azoxystrobin, DACO: 2.14.10
1889103	2010, Partition coefficient (n-Octanol/Water) of Azoxystrobin, DACO: 2.14.11
1889107	2010, Accelerated storage stability of Azoxystrobin, DACO: 2.14.13
1889110	2009, pH of Azoxystrobin, DACO: 2.16 CBI
2036991	2009, Production Chemistry of AZOXYSTROBIN_30Nov2009, DACO: 2.11.3
2038527	2010, Batch Data- Analysis of five representative batches of Azoxystrobin Technical – [CBI REMOVED], DACO: 2.13.3
2038568	2006, AZOXYSTROBIN: Detailed Analysis Of Technical Materials Representative of Established Large Scale Production, DACO: 2.13.3
2361404	2013, Chemistry-2.1, 2.2, 2.3, 2.3.1, 2.14.9-Azoxystrobin TGAI, DACO: 2.1,2.14.9,2.2,2.3,2.3.1
2361406	2013, Azoxystrobin TGAI: Product Identity and Composition, DACO: 2.11.1,2.11.2,2.11.3, 2.11.4,2.12.1

PMRA document number	Reference
2361408	2011, Preliminary Analysis and Enforcement Analytical Method of Azoxystrobin TGAI, DACO: 2.13.1,2.13.2,2.13.3
2361412	2011, Chemical and Physical Characterization of Azoxystrobin TGAI: Color, Physical State, Odor, Stability, Oxidation/Reduction, pH, UV-Vis, Melting Point, Density, Dissociation Constant, Partition Coefficient and Water Solubility, DACO: 2.14.1,2.14.10,2.14.11,2.14.12,2.14.13,2.14.2, 2.14.3,2.14.4,2.14.5,2.14.6,2.14.7,2.14.8,2.4,2.5,2.6,2.7,2.8,2.9
2441248	2014, Azoxystrobin manufacturing process, DACO: 2.11.1,2.11.2,2.11.3,2.11.4
2441249	2013, Analysis and Method Validation for 5 Batches of Azoxystrobin Technical Material, DACO: 2.13.4
2441255	2008, Reactivity with Packing Material of Azoxystrobin Technical, DACO: 2.14.13
2441256	2013, Purity Profile of 5 Batches of Azoxystrobin Technical, DACO: 2.13.1,2.13.2,2.13.3, 2.14.12,2.4,2.5,2.6,2.7,2.8,2.9
2476224	2011, Chemical and Physical Characterization of Azoxystrobin TGAI, DACO: 2.14.1,2.14.10, 2.14.11,2.14.12,2.14.13,2.14.15,2.14.2,2.14.3,2.14.4,2.14.6,2.14.7,2.14.8,830.7000
2476226	2012, Production Chemistry of Technical Azoxystrobin, DACO: 2.11.1,2.11.2,2.11.3,2.11.4, 2.2,2.4,2.5,2.6,2.7,2.8,2.9
2476232	2011, Preliminary Analysis and Enforcement Analytical Method of Azoxystrobin TGAI, DACO: 2.13.1,2.13.2,2.13.3,2.13.4
2559900	2015, MANUFACTURE PROCESS AND SYNTHESIS PATHWAY: Azoxystrobin Technical Grade Material, DACO: 2.11.1,2.11.2,2.11.3
2559911	2015, Preliminary Analysis and Enforcement Analytical Method of Azoxystrobin TGAI, DACO: 2.13.1,2.13.2,2.13.3,2.13.4
2559912	2015, Chemical and Physical Characterization of Azoxystrobin TGAI: Color, Physical State, Odor, Density, pH, Melting Point, UV-Vis, Partition Coefficient, Solubility, Vapor Pressure, Stability and Corrosion Characteristics, DACO: 2.13.1,2.14.1,2.14.11,2.14.12,2.14.13,2.14.14,2.14.15, 2.14.2,2.14.3,2.14.4,2.14.6,2.14.7,2.14.8,2.14.9,2.4,2.5,2.6,2.7,2.8,2.9,830.7000
2674710	2016, Supplier Details for Reagents and Solvents for SHARDA AZOXYSTROBIN TECHNICAL, PCPA Reg. No. 31723, DACO: 2.11.2
2678976	2014, Determination of content in Eight Representative Production batches of Azoxystrobin technical, DACO: 2.13.4
2679285	2011, Azoxystrobin Analytical Profile, DACO: 2.12.1,2.13,2.13.1,2.13.2,2.13.3
2694226	2012, 5-Batch analysis: Azoxystrobin TGAI, DACO: 2.13.4
2730392	2017, Technology Dossier Production of Technical Azoxystrobin - revised manufacturing process, DACO: 2.11.3
2738872	2011, Validation of Analytical Methodology in Azoxystrobin TGAI, DACO: 2.13.1

PMRA document number	Reference
2714698	2015, Determination of the Active Ingredient Content and Impurity Profile of Azoxystrobin, DACO: 2.13.1,2.13.2,2.13.3,2.13.4
2824497	2017, Method validation in Azoxystrobin Technical, DACO: 2.13.4
2748672	2017, Five Batch Analysis of Azoxystrobin Technical, DACO: 2.13.1,2.13.2,2.13.3,2.13.4,2.14.12,2.15
2748673	2017, Five Batch Analysis of Azoxystrobin Technical, DACO: 2.13.1,2.13.2,2.13.3,2.13.4,2.15
2748674	2017, Five Batch Analysis of Azoxystrobin Technical Amendment 1, DACO: 2.13.4
2817541	2017, Five Batch Analysis of Azoxystrobin Technical To Determine The Content Of Specified Impurities and Associated Method Validation, DACO: 2.13.4
2952498	2016, Preliminary Analysis, Enforcement Analytical Method & Qualitative & Quantitative Profile of test substance Azoxystrobin Technical DACO: 2.13.1,2.13.2,2.13.3,2.13.4
2952502	2014, Preliminary Analysis of Azoxystrobin TGAI , DACO: 2.13.2,2.13.3,2.13.4
3079172	2020, Preliminarly Analysis and Validation of Analytical Methods of Azoxystrobin TGAI, DACO: 2.13.1,2.13.3,2.13.4
2748132	2015, Determination of Azoxystrobin and Impurities in Five Batches of Azoxystrobin Technical, DACO: 2.13.1,2.13.2,2.13.3,2.13.4
2952493	2015, Product Identity and Composition Azoxystrobin TGAI DACO: 2.11.2,2.11.3,2.11.4,2.12.1,2.2,2.3,2.3.1,2.4,2.5,2.6,2.7,2.8,2.9
2952496	2018, Product Identity and Composition Azoxystrobin TGAI DACO: 2.11.2,2.11.3,2.11.4,2.12.1,2.2,2.3,2.3.1,2.4,2.5,2.6,2.7,2.8,2.9
3100255	2020, Azoxystrobin TGAI II Product Identity and Composition - Amended, DACO: 2.11.1,2.11.2,2.11.3,2.11.4,2.12.1
2748143	2015, Product Identity Description of the Materials Used, Description of the Production Process, Discussion of the Formation of Impurities for MCW 403 (Azoxystrobin) Technical, DACO: 2.11.1,2.11.2,2.11.3,2.11.4,2.2,2.4,2.5,2.6, 2.7,2.8,2.9
2761934	2017, Determination of concentration in Azoxystrobin TC, DACO: 2.13.4

B. Information considered for the updated toxicological assessment

Studies/information submitted by registrant

PMRA document number	Reference
954467	2003. Summary of Acute Toxicology Studies with Azoxystrobin ME (95) (A13972A). DACO 4.2.1
1177955	1991. E5504: skin sensitisation to the guinea pig. DACO. 4.2.6
1177956	1992. Amendment to: ICIA5504: 90-day feeding study in rats. DACO 4.3.1

PMRA document number	Reference
1177957	1994. ICIA5504: 1year oral toxicity study in dogs. DACO 4.3.2
1177962	1995. E5504: Acute oral toxicity to the rat. DACO 4.2.1
1177963	1991. E5504: Acute dermal toxicity to the rat. DACO 4.2.2
1177964	1992. ICIA5504: 4-hour acute inhalation toxicity study in the rat. DACO 4.2.3
1177965	1991. E5504: Eye irritation to the rabbit. DACO 4.2.4
1177966	1991. E5504: Skin irritation to the rabbit. DACO 4.2.5
1177958, 1177967, 1177968	ICIA5504: 2 year feeding study in mice. DACO 4.4.3
1177969, 1177970, 1177971	1995. ICIA5504: Two year feeding study in rats. DACO 4.4.4
1177972, 1177973, 1177974	1995. ICIA5504: Multigenerational study in rats. And response to deficiency "attachments". DACO 4.5.1
1177975, 1227047	1994. E5504: Teratogenicity study in the rat. And response to deficiency "attachment". DACO 4.5.2
1177976	1994. ICIA5504: Developmental toxicity study in the rabbit. DACO 4.5.3
1177977	1992. ICIA5504: An evaluation of mutagenic potential using S.typhimurium and E.coli. DACO 4.5.4
1177978	1995. Evaluation of the suitability of different vehicles for use in developmental toxicity studies in the rabbit. DACO 4.5.3
1177979	1995. ICIA5504: Second dose range finding study in the rabbit. DACO 4.5.3
1177980	1995. ICIA5504: Second dose range finding study in the pregnant rabbit. DACO 4.5.3
1177981	1995. ICIA5504: Rabbit metabolite profiles. DACO 4.5.3
1177982, 1177983	1995. ICIA5504: Comparison of exposure in the non-pregnant rabbit. DACO 4.5.3
1177984	1995. ICIA5504: Comparison of exposure in the pregnant rabbit dose range finding study. DACO 4.5.3
1177985	1995. ICIA5504: Assessment of teratogenicity in the rabbit. DACO 4.5.3
1177988	1993. ICIA5504: assessment of mutagenic potential using l5178Y mouse lymphoma cells. DACO 4.5.5
1177999	1992. E5504: An evaluation in the in vitro cytogenetic assay in human lymphocytes. DACO 4.5.6
1178002	1992. E5504: Assessment for the induction of unscheduled DNA synthesis in rat hepatocytes in vivo. DACO 4.5.7
1178003	1992. E5504: An evaluation in the mouse micronucleus test and first supplement. DACO 4.5.8
1178004	1996. ICIA5504: A review of developmental toxicity studies in the rabbit. DACO 4.5.3
1178005	1995. ICIA5504: Dose range finding study in the rabbit. DACO 4.5.3
1178006	1995. ICIA5504: Embryotoxicity study in the rabbit. DACO 4.5.3

PMRA document number	Reference
1178007	1995. ICIA5504: Dose range finding study in the pregnant rabbit. DACO 4.5.3
1178036	1994. ICIA5504: Detailed analysis of technical materials used in toxicological studies. DACO 4.8
1178040	1994. ICIA5504: 90-day feeding study in mice. DACO 4.3.1
1178041	1994. ICIA5504: 21-day dermal toxicity study in the rat. DACO 4.3.5
1178050	1993. ICIA5504: 90-day oral dosing study in dogs. DACO 4.3.8
1178061, 2807522	1994. ICIA5504: Acute neurotoxicity study in rats. DACO 4.5.10
1178072	1993. ICIA5504: Subchronic neurotoxicity study in rats. DACO 4.5.11
1179758	1993. ICIA5504: Whole body autoradiography in the rat following a single oral dose (1 mg/kg). DACO 4.5.9
1179759	ICIA5504: Excretion and tissue retention of a single oral dose (1 mg/kg) in the rat. DACO 4.5.9
1179760	1993. ICIA5504: Excretion and tissue retention of a [14C]-labelled single oral dose (1 mg/kg) following fourteen daily unlabelled doses in the rat. DACO 4.5.9
1179761	1993. ICIA5504: Excretion and tissue retention of a single oral dose (100 mg/kg) in the rat. DACO 4.5.9
1179762	1993. ICIA5504: BIOTRANSFORMATION IN THE RAT. DACO 4.5.9
2385138, 2544875	2013. Azoxystrobin Amistar 8 (A13368B) - A 28 Day Inhalation Toxicity Study in Rats. DACO 4.3.7
2570972	2015. SYN545974 - Screening Oral (Gavage) Toxicity Study in the Rat. DACO 4.2.9
2796283	2012. Acute oral toxicity study of Azoxystrobin in Rats. DACO 4.2.1
2796284	2012. Acute Dermal Toxicity study of Azoxystrobin in rats. DACO 4.2.2
2796285	2012. Acute Inhalation toxicity study of Azoxystrobin in Rats. DACO 4.2.3
2796286	2012. Acute Eye Irritation Study Of Azoxystrobin in Rabbits. DACO 4.2.4
2796287	2012. Acute Dermal Irritation study of Azoxystrobin in Rabbits. DACO 4.2.5
2796288	2012. Skin Sensitization study of Azoxystrobin in Guinea Pigs. DACO 4.2.6
2796289	2012. Bacterial Reverse Mutation Test of Azoxystrobin Using Salmonella Typhimurium. DACO 4.5.4
2796290	2012. Micronucleus Test of Azoxystrobin in Mice. DACO 4.5.5
2796291	2013. QSAR Assessment of Toxicological Properties of Azoxystrobin and its impurities. DACO 4.5.9
2797769	2016. Acute oral toxicity (up & down procedure) in rat with azoxystrobin technical. DACO 4.2.1
2797770	2014. Acute oral toxicity (limit test) in the rat with azoxystrobin technical. DACO 4.2.1
2797771	2016. Acute dermal toxicity (limit test) in the rat with azoxystrobin technical. DACO 4.2.2
2797772	2016. Acute dermal irritation/corrosion in the rabbit with azoxystrobin technical. DACO 4.2.2

PMRA document number	Reference
2797773	2016. Azoxystrobin technical acute inhalation toxicity study (nose-only) in the rat. DACO 4.2.3
2797774	2015. Screening for the eye irritancy potential using the bovine corneal opacity & permeability assay with azoxystrobin technical. DACO 4.2.4
2797775	2016. Acute eye irritation/corrosion in the rabbit with azoxystrobin technical. DACO 4.2.4
2797776	2006. Skin sensitization test of MILS130/05 (azoxystrobin tech) in guinea pigs (cavia porcellus) (Buehler test method). DACO 4.2.6
2797777	2016. Test for sensitisation (local lymph node assay-LLNA) with azoxystrobin technical. DACO 4.2.6
2797778	2015. In vitro skin irritation: human skin model test (EPSKIN-SM TM) with azoxystrobin technical. DACO 4.2.9
2797779	2015. Reverse mutation assay using bacteria (salmonella typhimurium & escherichia coli) with azoxystrobin technical. DACO 4.5.4
2797780	2016. Mammalian micronucleus test of murine peripheral blood cells with azoxystrobin technical. DACO 4.5.5
2797781	2014. In vitro cytogenetic assay measuring chromosomal aberration frequencies induced by azoxystrobin technical in CHO cell. DACO 4.5.7
2807497	2005. Azoxystrobin metabolite R234886: Acute Oral Toxicity Study in the Rat (Up and Down Procedure). DACO 4.2.1
2807499	1993. ICIA5504: Preliminary Metabolism and pharmacokinetics in the rat and dog. DACO 4.2.1
2807500	1997. 4-Hour Acute Inhalation Toxicity Study in Rats. DACO 4.2.3
2807501	1997. 1-Hour Acute Inhalation Toxicity Study in Rats. DACO 4.2.3
2807502	2002. Syngenta's Response to EPA's Request for a 28-Day Nose-Only Inhalation Toxicity Study. DACO 4.3.6
2807503	2017. Summary of the decision to remove the 10X database uncertainty factor from the azoxystrobin inhalation exposure risk assessment. DACO 4.3.6
2807505	2005. Azoxystrobin metabolite R234886: bacterial mutation assay in S.typhimurium and E.coli. DACO 4.5.4
2807507	1996. First Supplement to ICI5504 - Acute Neurotoxicity Study in Rats (Supplement to MRID 43678134) Volume 1. DACO4.5.12
2807508	1993. ICIA5504: Preliminary Acute Neurotoxicity Study in Rats. DACO 4.5.12
2807509	1996. First Supplement to ICIA5504: Subchronic Neurotoxicity Study in Rats. DACO 4.5.13
2807510	1999. Azoxystrobin and R234886: Determination in Human and Animal Plasma By LC-UV and LC-MS. DACO 4.8

Additional information considered

Published information

PMRA document number	Reference
2997453	1999. Evaluation of the new active Azoxystrobin in the product AMISTAR WG FUNGICIDE. National Registration Authority for Agricultural and Veterinary Chemicals. September 1999 https://apvma.gov.au/sites/default/files/publication/19846-prs-azoxystrobin-amistar-wg-fungicide.pdf
2997454	2018. Azoxystrobin; Pesticide Tolerances. A Rule by the Environmental Protection Agency on 11/15/2018 https://www.federalregister.gov/documents/2018/11/15/2018-24974/azoxystrobin-pesticide-tolerances
2997456	2006. Evaluation Report Azoxystrobin. December 2006. Food Safety Commission. Japan. https://www.fsc.go.jp/english/evaluationreports/pesticide/evaluationreport_azoxystrobin.pdf
2997457	2015. Safety of the Food Chain Pesticides and Biocides. Azoxystrobin. SANCO/11027/2011 Rev 3 20 March 2015. http://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/public/?event=activesubstance.ViewReview&id=908
222590 .1	2001. Azoxystrobin. Human Health Risk Assessment for Residues in/on Blueberry, Grasses (grown for seed), Lychee, Mango, Mint (fresh and processed), Mustard Greens, Pepper (bell and non-bell), Strawberry and Watercress, Crop Subgroups 5B, Leafy Brassica and Turnip greens and 13B, Bushberry and Various Tropical Fruits. US EPA.

Unpublished information

PMRA document number	Reference
2997450	2015. Azoxystrobin: Human Health Draft Risk Assessment for Registration Review. USEPA.
2997451, 2997452	1997. Monograph Azoxystrobin Volume 3. Summary, Scientific Evaluation and Assessment. Germany for EFSA.
2807504	Memorandum for Hazard and Science Policy Council (HASPOC) decision on the waiver request for a subchronic inhalation study on active ingredient (ai). DACO 4.3.6

C. Information considered in the dietary assessment

Studies/information submitted by registrant

PMRA Document Number	Reference
3295020	2021. Azoxystrobin – Metabolism of [^{14}C]-Azoxystrobin in the Lactating Goat, Final Report. DACO. 6.2

Additional information considered

Published information

PMRA Document Number	Reference
	CFIA, 2012a. Pesticide Residues Unit Analytical Methods Manual. Method: PMR-001-V1.11 Determination of Pesticides in Fruits and Vegetables (with Solid Phase Extraction Clean-Up and GC/MSD and HPLC Fluorescence Detection). Effective 1 November 2012.
	CFIA, 2012b. Pesticide Residues Unit Analytical Methods Manual. Method: PMR-005-V1.7 Determination of Pesticides in Difficult Matrix Fruits and Vegetables (with Solid Phase Extraction Clean-Up and GC/MSD and HPLC Fluorescence Detection). Effective 1 November 2012.
	EFSA, 2009. Assessment Report: Azoxystrobin.
	JMPR, 2008. Azoxystrobin (229) Evaluation Report.
	OECD, 2008. Test Guideline No. 508: Magnitude of the Pesticide Residues in Processed Commodities, OECD Guidelines for the Testing of Chemicals, Section 5, OECD Publishing. doi:10.1787/9789264067622-en
	PMRA, 2000. Regulatory Note REG2000-15: Azoxystrobin.
	PMRA, 2007. Regulatory Note REG2007-02: Azoxystrobin and Dynasty 100FS Fungicide.
	PMRA, 2018. Re-evaluation Note REV2018-13, Re-evaluation Project Plan for Azoxystrobin
	USEPA, 2010. Azoxystrobin. Petition for the Addition of an Ultra-low Volume Application to Corn. Summary of Analytical Chemistry and Residue Data.
	USEPA, 2018. Azoxystrobin Interim Registration Review Decision, Case Number 7020, December 2018.

D. Information considered in the updated occupational and non-occupational assessment

Studies/information submitted by Task Forces

PMRA Document Number	Reference
2115788	Agricultural Reentry Task Force (ARTF). 2008. Data Submitted by the ARTF to Support Revision of Agricultural Transfer Coefficients.
1563654	Merricks et al., 1999. Exposure of Professional Lawn Care Workers During the Mixing and Loading of Dry and Liquid Formulations and the Liquid Application of Turf Pesticides Utilizing a Surrogate Compound. OMA002. ORETF.
2115788	Agricultural Reentry Task Force (ARTF). 2008. Data Submitted by the ARTF to Support Revision of Agricultural Transfer Coefficients.
1913109	AHETF, 2009. Agricultural Handler Exposure Scenario Monograph: Open Cab Groundboom Application of Liquid Sprays. Report Number AHE1004. December 23, 2009.
2172938	AHETF, 2012. Agricultural Handler Exposure Scenario Monograph: Closed Cockpit Aerial Application of Liquid Sprays. Report Number AHE1007. January 20, 2012.
2572743	AHETF, 2014. Agricultural Handler Exposure Scenario Monograph: Open Cab Airblast Application of Liquid Sprays. Report Number AHE1006. October 20, 2014.
2572744	AHETF, 2015. Agricultural Handler Exposure Scenario Monograph: Open Pour Mixing and Loading Dry Flowable Formulations. Report Number AHE1001-1. March 31, 2015.
2572745	AHETF, 2015. Agricultural Handler Exposure Scenario Monograph: Open Pour Mixing and Loading of Liquid Formulations. DACO5.3, 5.4
2115788	Data Submitted by the Agricultural Reentry Task Force (ARTF) to Support Revision of Agricultural Transfer Coefficients. DACO5.6
1885209 2313618	Krolski, ME. 2010. Observational Study to Determine Dermal and Inhalation Exposure to Workers in a Commercial Seed Treatment Facilities: Mixing/Treating with a Liquid Pesticide Product and Equipment Clean-out. AHETF, AH806.
1335563 1449840 2313625	Krolski, M.E. November 20, 2006, GAUCHO 480 SC – Worker Exposure During On-farm and Commercial Seed Treatment of Cereals, Bayer CropScience Environmental Research Bayer Research Park 17745 South Metcalf Avenue Stilwell, KS 66085-9104 & Grayson Research, LLC 1040 Grayson Farm Road Creedmoor, NC 27522. RANTY012. Unpublished. AHETF, AH803.
1571553 1965962 2313628	Zietz, E. October 25, 2007. Determination of Operator Exposure to Imidacloprid During Loading/Sowing of Gaucho Treated Maize Seeds Under Realistic Field Conditions in Germany and Italy. SGS Institut Fresenius GmbH, Tanunusstein, Germany, Study Number IF-05/00328969. Unpublished. AHETF, AH825.

Additional information considered

Published information

PMRA Document Number	Reference
2409268	US EPA (2012). Standard Operating Procedures for Residential Pesticide Exposure Assessment. EPA: Washington, DC. Revised October 2012.
	Center for Golf Course Management. (1992). Golf Course Operations: Cost of Doing Business/Profitability. Library of Congress GV975.G56.

Unpublished information

PMRA document number	Title
1039216	1990. Exposures of Workers to Isofenphos During Planting of Oftanol-Treated Canola Seeds.

E. Information considered in the updated environmental assessment

Studies/information submitted by registrant

PMRA document number	Title
712816	1995, Assessment of Side Effects of ICI-90340-F-O-SC on the Predatory Mite, Typhlodromus pyri Scheuten (Acari, Phytoseiidae) in a Vineyard under Field Conditions (One Location in Germany), DACO: 9.2.5
712817	1995, Field Study for Testing the Effects of ICI-90340-F-O-SC on Predatory Mites (Typhlodromus pyri) in Vines with Two Pre-Blooming and Six Post-Blooming Stage Applications, DACO: 9.2.5
712818	1995, Field Study for Testing the Effects of ICI-90130-F-O-WG on Predatory Mites (Typhlodromus pyri) in Vines with Two Pre-Blooming and Six Post-Blooming Stage Applications, DACO: 9.2.5
712819	1994, Final Report on the Field Study for Testing the Pesticide ICI-90340-F-O-SC on Predatory Mites (Typhlodromus pyri) in Viticulture, DACO: 9.2.5
712820	1995, ICIA5504: An Extended Laboratory Study to Evaluate the Side-Effects of a 25% SC Formulation on Adults of the Parasitic Wasp Aphidius rhopalosiphi, DACO: 9.2.6
712821	1994, An Evaluation of the Side-Effects of Fresh Residues of the Fungicide ICIA5504 on Adult Trichogramma cacoeciae, DACO: 9.2.6

PMRA document number	Title
712822	2000, Azoxytstrobin 250G/L SC (YF10537): An extended Laboratory Test to Determine Effects on the Parasitoid, Aphidius Rhopalosiphi, DACO: 9.2.6
712823	1997, BBA Toxicity Test with Sediment-dwelling Chironomus riparius, DACO: 9.3.4
712824	1994, Final Report on the Field Study for Testing the Pesticide ICI-90130-F-O-WG on Predatory Mites (Typhlodromus pyri) in Viticulture, DACO: 9.2.5
712826	2001, A rate-response laboratory test to evaluate the effects of a 250 g/L SC formulation on the predatory mite, Typhlodromus pyri, DACO: 9.2.5
712827	1997, Sediment Toxicity Test with Chironomus riparius, DACO: 9.3.4
712831	2001, Soil Dissipation trial to determine levels of azoxystrobin and its significant soil degradation products in soil under conditions representative of the foliar use on canola, DACO: 8.3.4
712833	2003, QUADRIS Flowable Fungicide: Dissipation and accumulation trial to determine levels of azoxystrobin and its significant soil degradation products in soil, after application on canola., DACO: 8.3.4
712834	2003, QUADRIS Flowable Fungicide: Dissipation and accumulation trial to determine levels of azoxystrobin and its significant soil degradation products in soil, after application on canola., DACO: 8.3.4
712836	1994, ICIA5504: Investigation into the toxicity of a 250g/L SC formulation to the larvae of the Hoverfly Episyrphus balteatus (Diptera: syrphidae), DACO: 9.2.5
712837	1995, Study of Unintended Effects of the Products EXP87 and EXP46 on Kampimodromus aberrans (OUD.) in Vineyards, DACO: 9.2.5
712838	2002, QUADRIS Flowable Fungicide: Soil Dissipation trial to determine levels of azoxystrobin and its significant soil degradation products in soil under conditions representative of the foliar use on potatoes., DACO: 8.3.4
712839	1994, ICIA5504: Mobility of ICIA5504 and its Degradation Products in Prepared Soil Columns, DACO: 8.2.4.3.2
712840	1995, ICIA5504: Leaching of Formulated Materials in Soil Columns, DACO: 8.2.4.3.2
712844	1994, ICIA5504: Investigation into the Toxicity of a 250g/L SC Formulation to the Carabid Beetle Poecilus cupreus, DACO: 9.2.5
712845	1995, Field Study for Testing the Effects of ICI-90130-F-O-WG on Predatory Mites (Typhlodromus pyri) in Vines with Two Pre-Blooming and Six Post-Blooming Stage Applications, DACO: 9.2.5

PMRA document number	Title
712846	1995, Field study for Testing the Effects of ICI-90340-F-O-SC on Predatory Mites (Typhlodromus pyri) in Vines with Two Pre-Blooming and Six Post-Blooming Stage Applications, DACO: 9.2.5
712847	1995, Assessment of Side Effects of ICI-90130-F-O-WG on the Predatory Mite, Typhlodromus pyri Scheuten (Acari, Phytoseiidae) in a Vineyard under Field Conditions (One Location in Germany), DACO: 9.2.5
1051108	2005, Dissipation and Accumulation Trial to Determine Levels of Azoxystrobin and its Significant Soil Degradation Products in Soil, Runoff and Tile Drain Effluent After Application on Turf, DACO: 8.3.4
1051109	2005, Dissipation and Accumulation Trial to Determine Levels of Azoxystrobin and its Significant Soil Degradation Products in Soil, Runoff and Tile Drain Effluent After Application on Turf, DACO: 8.3.4
1051110	2005, Dissipation and Accumulation Trial to Determine Levels of Azoxystrobin and its Significant Soil Degradation Products in Soil, Runoff and Tile Drain Effluent After Application on Turf, DACO: 8.3.4
1051111	2005, Dissipation and Accumulation Trial to Determine Levels of Azoxystrobin and its Significant Soil Degradation Products in Soil, Runoff and Tile Drain Effluent After Application on Turf, DACO: 8.3.4
1081401	1994, ICIA5504: Investigation into the Toxicity of a 250g/L SC Formulation to the Carabid Beetle Poecilus cupreus, DACO: 9.2.5
1081402	1995, Field Study for Testing the Effects of ICI-90130-F-O-WG on Predatory Mites (Typhlodromus pyri) in Vines with Two Pre-Blooming and Six Post-Blooming Stage Applications, DACO: 9.2.5
1081403	1995, Field study for Testing the Effects of ICI-90340-F-O-SC on Predatory Mites (Typhlodromus pyri) in Vines with Two Pre-Blooming and Six Post-Blooming Stage Applications, DACO: 9.2.5
1081404	1995, Assessment of Side Effects of ICI-90130-F-O-WG on the Predatory Mite, Typhlodromus pyri Scheuten (Acari, Phytoseiidae) in a Vineyard under Field Conditions (One Location in Germany), DACO: 9.2.5
1081405	1995, Assessment of Side Effects of ICI-90340-F-O-SC on the Predatory Mite, Typhlodromus pyri Scheuten (Acari, Phytoseiidae) in a Vineyard under Field Conditions (One Location in Germany), DACO: 9.2.5
1081406	1995, Field Study for Testing the Effects of ICI-90340-F-O-SC on Predatory Mites (Typhlodromus pyri) in Vines with Two Pre-Blooming and Six Post-Blooming Stage Applications, DACO: 9.2.5

PMRA document number	Title
1081407	1995, Field Study for Testing the Effects of ICI-90130-F-O-WG on Predatory Mites (Typhlodromus pyri) in Vines with Two Pre-Blooming and Six Post-Blooming Stage Applications, DACO: 9.2.5
1081408	1994, Final Report on the Field Study for Testing the Pesticide ICI-90340-F-O-SC on Predatory Mites (Typhlodromus pyri) in Viticulture, DACO: 9.2.5
1081409	2001, Soil Dissipation trial to determine levels of azoxystrobin and its significant soil degradation products in soil under conditions representative of the foliar use on potatoes, DACO: 8.3.2.1
1081410	2001, Soil Dissipation trial to determine levels of azoxystrobin and its significant soil degradation products in soil under conditions representative of the foliar use on canola, DACO: 8.3.2.1
1081411	1994, ICIA5504: Mobility of ICIA5504 and its Degradation Products in Prepared Soil Columns, DACO: 8.2.4.3.2
1081416	1994, ICIA5504: Investigation into the toxicity of a 250g/L SC formulation to the larvae of the Hoverfly Episyrphus balteatus (Diptera: syrphidae), DACO: 9.2.5
1081417	Study of Unintended Effects of the Products EXP87 and EXP46 on Kampimodromus aberrans (OUD.) in Vineyards, DACO: 9.2.5
1081418	2000, Azoxytstrobin 250G/L SC (YF10537): An extended Laboratory Test to Determine Effects on the Parasitoid, Aphidius Rhopalosiphi, DACO: 9.2.6
1081419	1994, Final Report on the Field Study for Testing the Pesticide ICI-90130-F-O-WG on Predatory Mites (Typhlodromus pyri) in Viticulture, DACO: 9.2.5
1081420	1994, Etude Des Effets Non Intentionnels de Specialites Agropharmaceutiques sur Typhlodromus pyri, DACO: 9.2.5
1081421	1995, ICIA5504: An Extended Laboratory Study to Evaluate the Side-Effects of a 25% SC Formulation on Adults of the Parasitic Wasp Aphidius rhopalosiphi, DACO: 9.2.6
1081422	1994, An Evaluation of the Side-Effects of Fresh Residues of the Fungicide ICIA5504 on Adult Trichogramma cacoeciae, DACO: 9.2.6
1081424	1997, Sediment Toxicity Test with Chironomus riparius, DACO: 9.3.4
1081426	2001, A rate-response laboratory test to evaluate the effects of a 250 g/L SC formulation on the predatory mite, Typhlodromus pyri, DACO: 9.2.5
1178000	1994, ICIA5504: AQUEOUS HYDROLYSIS AT PH 5, 7 AND 9 AT 25 DEGREES CELCIUS AND 50 DEGREES CELCIUS., DACO: 8.2.3.2,8.2.3.5.2
1178001	1995, ICIA5504: SOIL SURFACE PHOTOLYSIS., DACO: 8.2.3.3.1

PMRA document number	Title
1178008	1996, ICIA5504: DEGRADATION IN SOIL UNDER AEROBIC AND ANAEROBIC LABORATORY CONDITIONS:, DACO: 8.2.3.3.1,8.2.3.4.2,8.2.3.4.4
1178009	1994, ICIA5504: DEGRADATION IN WATER-SEDIMENT SYSTEMS UNDER LABORATORY CONDITIONS., DACO: 8.2.3.5.6
1178010	1996, ICIA5504 (AZOXYSTROBIN) TECHNICAL FUNGICIDE AND END-USE FORMULATIONS., DACO: 8.2.1
1178011	1993, ICIA5504: TOXICITY TO THE EARTHWORM EISENIA FOETIDA., DACO: 9.2.3.1
1178012	1993, ICIA5504: ACUTE CONTACT AND ORAL TOXICITY TO HONEY BEES (APIS MELLIFERA) OF TECHNICAL MATERIAL., DACO: 9.2.4.1,9.2.4.2
1178013	1994, ICIA5504: ACUTE TOXICITY OF THE TECHNICAL MATERIAL TO FIRST INSTAR DAPHNIA MAGNA., DACO: 9.3.2
1178014	1993, R234886: ACUTE TOXICITY TO DAPHNIA MAGNA., DACO: 9.3.2
1178015	1994, ICIA5504: CHRONIC TOXICITY TO DAPHNIA MAGNA., DACO: 9.3.3
1178016	1992, ICIA5504: ACUTE TOXICITY TO RAINBOW TROUT (ONCORHYNCHUS MYKISS)., DACO: 9.5.2.1
1178017	1993, R234886: ACUTE TOXICITY TO RAINBOW TROUT (ONCORHYNCHUS MYKISS)., DACO: 9.5.2.1
1178018	1992, ICIA5504: ACUTE TOXICITY TO BLUEGILL SUNFISH (LEPOMIS MACROCHIRUS)., DACO: 9.5.2.2
1178019	1994, ICIA5504: AQUEOUS PHOTOLYSIS AT PH7., DACO: 8.2.3.3.2
1178020	1994, ICIA5504: EARLY LIFE STAGE TOXICITY OF ICIA5504 TO THE FATHEAD MINNOW (PIMEPHALES PROMELAS) UNDER FLOW THROUGH CONDITIONS., DACO: 9.5.3.1
1178021	1992, ICIA5504: ACUTE ORAL TOXICITY (LD50) TO BOBWHITE QUAIL., DACO: 9.6.2.1
1178022	1992, ICIA5504: SUBACUTE DIETARY TOXICITY (LC50) TO BOBWHITE QUAIL., DACO: 9.6.2.4
1178023	1992, ICIA5504: SUBACUTE DIETARY TOXICITY (LC50) TO MALLARD DUCK., DACO: 9.6.2.5
1178024	1994, ICIA5504: EFFECTS ON REPRODUCTION IN MALLARD DUCK AFTER DIETARY ADMINISTRATION., DACO: 9.6.3.2
1178025	1994, ICIA5504: TOXICITY TO THE FRESHWATER DIATOM (NAVICULA PELLICULOSA)., DACO: 9.8.2
1178026	1993, ICIA5504: TOXICITY TO THE BLUE-GREEN ALGA (ANABAENA FLOS-AQUAE)., DACO: 9.8.2

PMRA document number	Title
1178027	1994, ICIA5504: TOXICITY TO THE GREEN ALGA (SELENASTRUM CAPRICORNUTUM)., DACO: 9.8.2
1178028	1993, R234886: TOXICITY TO THE GREEN ALGA (SELENASTRUM CAPRICORNUTUM)., DACO: 9.8.2
1178029	1994, ICIA5504: A TIER 1 GLASSHOUSE STUDY TO EVALUATE THE EFFECTS ON SEEDLING EMERGENCE ON TERRESTRIAL NON-TARGET PLANTS., DACO: 9.8.4
1178030	1994, ICIA5504: ADSORPTION AND DESORPTION IN SOIL., DACO: 8.2.4.2
1178031	1994, ICIA5504: A TIER 1 GLASSHOUSE STUDY TO EVALUATE THE EFFECTS ON VEGETATIVE VIGOUR ON TERRESTRIAL NON-TARGET PLANTS., DACO: 9.8.4
1178032	1995, ICIA5504: A TIER 1 GLASSHOUSE STUDY TO EVALUATE THE EFFECTS ON VEGETATIVE VIGOUR ON BRASSICA NAPUS., DACO: 9.8.4
1178033	1995, ICIA5504: A TIER 1 GLASSHOUSE STUDY TO EVALUATE THE EFFECTS ON SEEDLING EMERGENCE ON ABUTILON THEOPHRASTI., DACO: 9.8.4
1178034	1995, ICIA5504: A TIER II GLASSHOUSE STUDY TO EVALUATE THE EFFECTS ON SEEDLING EMERGENCE ON BRASSICA NAPUS AND DAUCUS CAROTA., DACO: 9.8.4
1178035	1993, ICIA5504: TOXICITY TO THE DUCKWEED LEMNA GIBBA., DACO: 9.8.5
1178042	1995, ICIA5504: ADSORPTION AND DESORPTION PROPERTIES IN TWO USA SOILS., DACO: 8.2.4.2
1178043	1994, ICIA5504: ADSORPTION AND DESORPTION PROPERTIES IN SOIL OF R234886, A MAJOR SOIL METABOLITE., DACO: 8.2.4.2
1178044	1995, ICIA5504: OVERVIEW OF SOIL BEHAVIOUR., DACO: 8.3.1
1178045	1995, ICIA5504: ADSORPTION AND DESORPTION PROPERTIES IN SOIL OF R401553, A MAJOR SOIL DEGRADATE., DACO: 8.2.4.2
1178046	1995, ICIA5504: ADSORPTION AND DESORPTION PROPERTIES IN SOIL OF R402173, A MAJOR SOIL DEGRADATE., DACO: 8.2.4.2
1178047	1995, ICIA5504: RIVER WATER PHOTOLYSIS., DACO: 8.2.3.3.2
1179740	1998, FIELD SOIL DISSIPATION STUDY CARRIED OUT IN CANADA DURING 1995-7, DACO: 8.3.2.1
1179817	1995, ICIA5504: FATE OF RADIOLABELLED MATERIAL APPLIED TO BARE SOIL IN CALIFORNIA, USA IN JUNE 1994 INCLUDING DATA UP TO ONE YEAR, DACO: 8.2.3.3.1,8.2.3.4.2,8.3.2.3
1179818	1995, ICIA5504: FIELD DISSIPATION TRIAL CARRIED OUT IN CALIFORNIA, USA DURING 1993/1994, DACO: 8.3.2.3

PMRA document number	Title
1179819	1995, ICIA5504: FIELD DISSIPATION TRIAL FOLLOWING TREATMENT TO TURF CARRIED OUT IN CALIFORNIA, USA, DURING 1993/1994, DACO: 8.3.2.3
1179820	1995, ICIA5504: FIELD DISSIPATION STUDY FOLLOWING TREATMENT TO TURF CARRIED OUT IN FLORIDA, USA, DURING 1993/1994, DACO: 8.3.2.3
1179822	1996, ICIA5504: FIELD SOIL DISSIPATION STUDY FOLLOWING TREATMENT TO BARE SOIL, DACO: 8.3.2.3
1179823	1996, ICIA5504: FIELD SOIL DISSIPATION STUDY CARRIED OUT IN THE USA (MISSISSIPPI) DURING 1993/94, DACO: 8.3.2.3
1179824	1996, ICIA5504: FIELD DISSIPATION STUDY FOLLOWING TREATMENT TO TURF CARRIED OUT IN FLORIDA, USA DURING 1993/1994-ANALYSIS OF DEGRADATES R401553 AND R402173, DACO: 8.3.2.3
1179826	1996, AZOXYSTROBIN: FIELD DISSIPATION IN CANADIAN PRAIRIE SOILS. TECHNICAL LETTER 95JH021/01, DACO: 8.3.2.1
1179862	1997, ICIA5504: FIELD DISSIPATION IN CANADIAN PRAIRIE SOILS 1995/7. TECHNICAL LETTER 95JH021/02, DACO: 8.3.2.1
2534912	2015, Lambda-cyhalothrin CS (A12690B) and Azoxystrobin/Isopyrazam SC (A16609D) - A Field Study to Evaluate Side Effects on Honeybees (*Apis mellifera* L.) in Winter Oil Seed Rape in Germany, Celle 2014. DACO: 9.2.4
2807512	1995, ICIA6604: Degredatation of 14C-Labelled Compound in Soil Under Laboratory Conditions, DACO: 8.2.3.4.2
2807513	1996, ICIA6604: Degredatation in Soil Under Aerobic and Anaerobic Laboratory Conditions: Final Report, DACO: 8.2.3.4.2
2807514	1993, ICIA5504: Acute Toxicity to Mysid Shrimp (Mysidopsis bahia), DACO: 9.4.2
2807515	1993, ICIA5504: Acute Toxicity to Larvae of the Pacific Oyster (Crassostrea gigas), DACO: 9.4.4
2807517	1997, Chronic Toxicity of Azoxystrobin to the Mysid, Mysidopsis bahia, DACO: 9.4.5
2807518	1992, ICIA5504: Acute Toxicity to the Sheepshead Minnow (Cyprinodon Variegatus), DACO: 9.5.2.4
3060433	2019, Azoxystrobin SC (A12705B) Azoxystrobin SC (A12705B) - Assessment of Potential Side Effects on the Honey Bee (Apis mellifera) in a Semi-Field Study after Application to Flowering Buckwheat (Fagopyrum esculentum) Draft Report, DACO: 9.2.4.6

PMRA document number	Title
3076215	2019, Azoxystrobin SC (A12705B) - Assessment of Potential Side Effects on the Honey Bee (Apis mellifera) in a Semi-Field Study after Application to Flowering Buckwheat (Fagopyrum esculentum), DACO: 9.2.4.6
3076216	2019, Azoxystrobin SC (A12705B) A Semi-field Study to Evaluate the Side Effects on the Honey Bee, Apis mellifera L., in Germany in 2019, DACO: 9.2.4.6
3076217	2019, Azoxystrobin and R230310 Analytical Method ECO_005_03B validation for the determination of azoxystrobin isomers in field samples of Phacelia tanacetifolia B., DACO: 9.2.4.6

Published information

PMRA document number	Title
3267863	2006, Toxicity of six pesticides to common frog (Rana temporaria) tadpoles. M. Johansson, H. Piha, H. Kylin & J. Merila. Environmental Toxicology and Chemistry 25:12, p 3164-3170DACO: 9.9
3424313	2009, Azoxystrobin – Volume 3, Annex B.8: Environmental Fate and Behaviour. European Food Safety Authority. DACO:12.5.8
3424315	2009, Azoxystrobin – Volume 3, Annex B.9: Ecotoxicology. European Food Safety Authority. DACO:12.5.9
3424316	2015, Registration Review: Draft Risk Assessment of the Environmental Fate and Ecological Risk of Azoxystrobin. US EPA. DACO: 12.5.8 and 12.5.9