

# **SUPPLEMENT**

to Protecting pollinators  
from pesticides

**CANOLA**



**POLLINATOR  
PARTNERSHIP**  
C A N A D A

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# HOW TO USE THIS DOCUMENT

This supplement to *Protecting Pollinators From Pesticides Canola* contains information on the pesticide regulatory process of the Pest Management Regulatory Agency (PMRA) and precautionary levels for pesticide products used in canola in Canada. It is meant to help stakeholders make more informed decisions when using pesticide products that may impact pollinators.

**Use Table 1: Formulated products and their active ingredients** to identify the active ingredient(s) in a given product.

**Use Table 2: Active ingredient pollinator precaution levels** to see the PMRA restriction levels (most, moderately, and least restrictive) for active ingredients.

**Use Table 3: Pollinator precaution levels** to learn how the PMRA determines precaution levels used in Table 2.

# UNDERSTANDING POLLINATOR TOXICITY, EXPOSURE, AND RISK



**Toxicity + Exposure = Risk**

While the terms, risk and toxicity, are sometimes used interchangeably, they mean different things and should not be confused. **Toxicity** (sometimes referred to as 'hazard') of an active ingredient to bees refers to how much it will harm a bee if there is exposure. Toxicity can occur orally (ingestion) or from topical exposure, and is tested in both these ways, at different life stages, and with both single and repeated exposure on bees. **Exposure** refers to the likelihood of a pesticide coming into contact with a pollinator and the levels at which exposure may occur. Exposure considerations incorporate crop-specific information such as the attractiveness of the flowers to pollinators, time of bloom, whether managed pollinators are brought to the crop, and whether the crop is harvested before bloom. Exposure levels are estimated for different pesticide application types and rates, and may use models or actual residue levels in pollen and nectar if they are available.

It is the combination of toxicity and exposure that determine **risk** of a pesticide on a particular crop or crop group. Risk considers whether exposure is likely to occur at levels that will result in toxicity to pollinators. Risk also considers the residual toxicity, meaning how long the residues present may pose a risk to pollinators.



# PMRA RISK CHARACTERIZATION FOR POLLINATORS

The Pest Management Regulatory Agency (PMRA), a part of Health Canada, is the branch of the Canadian federal government responsible for regulating pest control products under the authority of the Pest Control Products Act, including insecticides, herbicides, fungicides, and other products. The PMRA's primary mandate is to prevent unacceptable risks to Canadians and the environment from the use of these products. PMRA applies modern, evidence-based scientific approaches to assess whether the health and environmental risks of pesticides are acceptable. When there is potential exposure of bees to a crop protection product, the PMRA requires information to assess the risk to bees.

The PMRA characterizes the risk of a product (specific to formulation and application method) by using a tiered approach that assesses the information on toxicity and exposure. This tiered approach first establishes toxicity and exposure risks for honey bees at various life stages, and progresses to colony, semi-field, and field studies depending on the level of risk found in the first tier. The risk characterization also considers the risk to other bee species such as solitary bees and bumble bees. Honey bee information may be used as a surrogate for considering risk to other bee species, with information on toxicity and exposure for other bee species considered as available. Additionally, the attractiveness of crops to honey bees and other bees, and other agronomic considerations such as whether the crop is harvested before bloom, are considered. For more information, see *Guidance for Assessing Pesticides Risks to Bees*<sup>1</sup>.

The risk characterization is used by the PMRA to determine **precaution levels** and the mitigation measures required to reduce harm to bees. Precaution levels in this document are categorized as

most restrictive, moderately restrictive, and least restrictive.

When used according to the label, the PMRA considers the risk to bees and other pollinators acceptable for pesticides registered for use in Canada. The PMRA reassesses risk as new scientific information becomes available and label precautions and registrations can change. **It is critical that users read and understand the current registrations and product label prior to use to minimize exposure and risk to pollinators.**

## ASSESSING RISKS TO WILD BEES

Currently, PMRA pesticide toxicity testing requires testing only on honey bees, however studies on bumble bees, mason bees, and other species are increasingly received, reviewed, and incorporated into pollinator risk assessments for pesticides. Wild bees may be exposed to pesticides in ways different from honey bees (such as through nesting in the ground), and the toxicity effect of a pesticide can vary from one bee species to another (depending on life cycles, body size, nesting habits, etc.)<sup>2</sup>. The PMRA takes into account new information on pesticide toxicity and exposure to pollinators other than honey bees as it emerges, however, it is important to note that at this time there are many unknowns around exposure and toxicity to species beyond honey bees.

<sup>1</sup> USEPA, PMRA. 2014. Guidance for assessing pesticide risks to bees. Office of Chemical Safety and Pollution Prevention Office of Pesticide Programs Environmental Fate and Effects Division, Environmental Protection Agency, Washington DC; Environmental Assessment Directorate, Pest Management Regulatory Agency, Health Canada, Ottawa, ON; California Department of Pesticide Regulation.

<sup>2</sup> Boyle, N. K., T. L. Pitts-Singer, J. Abbott, A. Alix, D. L. Cox-Foster, S. Hinarejos, D. M. Lehmann, L. Moradin, B. O'Neill, N. E. Raine, R. Singh, H. M. Thompson, N. M. Williams, and T. Steeger. 2019. Workshop on Pesticide Exposure Assessment Paradigm for Non-Apis Bees: Foundation and Summaries. *Environmental Entomology*. 48(1):4–11.

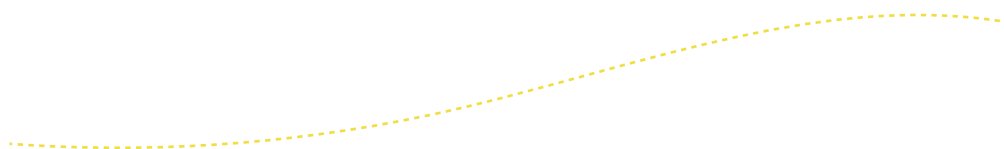


# TABLE 1.

## PESTICIDE PRODUCTS AND THEIR ACTIVE INGREDIENTS

Use Table 1 to look up specific products registered for use on canola and determine their active ingredient(s). Then go to Table 2 to check the precaution level for that active ingredient. These products were registered for use in Canada in canola in January 2023. For the most current product registration, use the PMRA's label search.

Product Name	Active Name
<b>Insecticides</b>	
ADVANTAGE DELTAMETHRIN 5 EC	DELTAMETHRIN
AMBUSH 500EC	PERMETHRIN
AVODIGEN	BACILLUS SUBTILIS STRAIN FMCH002 BACILLUS LICHENIFORMIS STRAIN FMCH001
BENEVIA INSECTICIDE	CYANTRANILIPROLE
BIOPROTEC CAF	BACILLUS THURINGIENSIS SUBSPECIES KURSTAKI (ALL STRAINS)
BUTEO START 480 FS	FLUPYRADIFURONE
BYI 02960 200SL INSECTICIDE	FLUPYRADIFURONE
CORAGEN INSECTICIDE	CHLORANTRANILIPROLE
CORAGEN MAX INSECTICIDE	CHLORANTRANILIPROLE
CRUISER 5FS SEED TREATMENT	THIAMETHOXAM
CYGON 480 SYSTEMIC INSECTICIDE	DIMETHOATE
CYGON 480-AG SYSTEMIC INSECTICIDE	DIMETHOATE
DECIS 100 EC INSECTICIDE	DELTAMETHRIN
DECIS 5 EC INSECTICIDE	DELTAMETHRIN
DECIS FLOWABLE INSECTICIDE	DELTAMETHRIN
DIAMANTE 4	DIMETHOATE
ECO BRAN GRASSHOPPER INSECTICIDE AGRICULTURAL	CARBARYL
FBN DELTAMETHRIN 5 EC INSECTICIDE	DELTAMETHRIN
FERRAMOL SLUG AND SNAIL BAIT	IRON (PRESENT AS FERRIC PHOSPHATE)
FORTENZA	CYANTRANILIPROLE



Product Name	Active Name
FYFANON 50% EC EMULSIFIABLE CONCENTRATE INSECTICIDE	MALATHION
FYFANON ULV	MALATHION
GAUCHO 480 FL INSECTICIDE	IMIDACLOPRID
GAUCHO 600 FL INSECTICIDE	IMIDACLOPRID
GENERAL HYDROPONICS EXILE	POTASSIUM SALTS OF FATTY ACIDS
HELIX VIBRANCE	DIFENOCONAZOLE FLUDIOXONIL METALAXYL-M AND S-ISOMER SEDAXANE THIAMETHOXAM
IPCO SYNCRO	PERMETHRIN
KOPA INSECTICIDAL SOAP	POTASSIUM SALTS OF FATTY ACIDS
LABAMBA INSECTICIDE	LAMBDA-CYHALOTHRIN
LAGON 480 E INSECTICIDE	DIMETHOATE
LOOPEX FC	AUTOGRAPHIA CALIFORNICA NUCLEOPOLYHEDROVIRUS FV11
LUMIDERM INSECTICIDE SEED TREATMENTB55	CYANTRANILIPROLE
LUMIPOSA	CYANTRANILIPROLE
MAKO INSECTICIDE	CYPERMETHRIN
MALATHION 500 EMULSIFIABLE CONCENTRATE INSECTICIDE	MALATHION
MALATHION 85E	MALATHION
MALATHION 95 ULV INSECTICIDE	MALATHION
MATADOR 120 EC EMULSIFIABLE CONCENTRATE INSECTICIDE	LAMBDA-CYHALOTHRIN
MUSTGROW CROP BIOFUMIGANT	ORIENTAL MUSTARD SEED MEAL
NEUDOSAN COMMERCIAL	POTASSIUM SALTS OF FATTY ACIDS
NIPSIT INSIDE 600 INSECTICIDE	CLOTHIANIDIN
NIPSIT SUITE CANOLA SEED PROTECTANT	CLOTHIANIDIN METCONAZOLE METALAXYL
OPAL INSECTICIDAL SOAP	POTASSIUM SALTS OF FATTY ACIDS
PERM-UP EMULSIFIABLE CONCENTRATE INSECTICIDE	PERMETHRIN
POLECI 2.5 EC INSECTICIDE	DELTAMETHRIN
PONCHO 600 FS SEED TREATMENT INSECTICIDE	CLOTHIANIDIN
POUNCE 384 EC INSECTICIDE	PERMETHRIN
PROSPER EVERGOL SEED TREATMENT	CLOTHIANIDIN METALAXYL PENFLUFEN TRIFLOXYSTROBIN
PROSPER FX	CLOTHIANIDIN METALAXYL TRIFLOXYSTROBIN CARBATHIIN



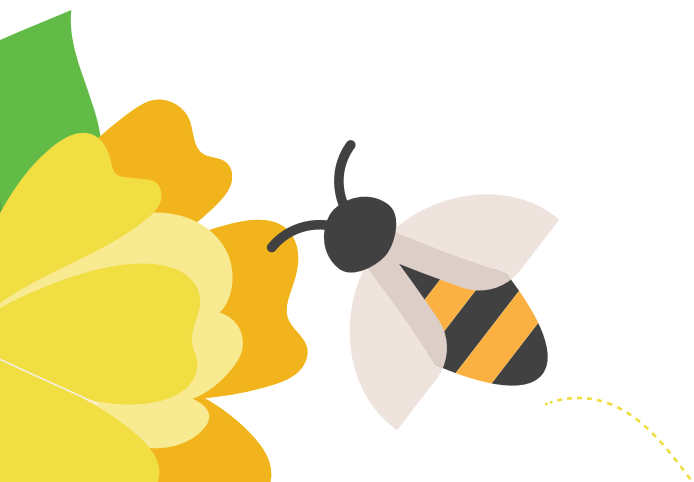
Product Name	Active Name
PROSPER T 200	CLOTHIANIDIN METALAXYL TRIFLOXYSTROBIN CARBATHIIN
QST713 LIQUID	BACILLUS SUBTILIS (STRAIN QST 713)
RASCENDO	SULFOXAFLOR
RIPCORD 400 EC AGRICULTURAL INSECTICIDE	CYPERMETHRIN
SALTRO	PYDIFLUMETOFEN
SEVIN XLR CARBARYL INSECTICIDE LIQUID SUSPENSION	CARBARYL
SHIP 250 EC INSECTICIDE	CYPERMETHRIN
SILENCER 120 EC EMULSIFIABLE CONCENTRATE INSECTICIDE	LAMBDA-CYHALOTHRIN
SLUGGO PROFESSIONAL SLUG AND SNAIL BAIT	IRON (PRESENT AS FERRIC PHOSPHATE)
SOMBRERO 600 FS	IMIDACLOPRID
TRANSFORM WG INSECTICIDE	SULFOXAFLOR
UP-CYDE 2.5 EC	CYPERMETHRIN
VAULT 50 FS INSECTICIDE SEED TREATMENT	ACETAMIPRID
VERCORAS INSECTICIDE SEED TREATMENT	CLOTHIANIDIN
VOLIAM XPRESS INSECTICIDE	LAMBDA-CYHALOTHRIN CHLORANTRANILIPROLE
WARRIOR INSECTICIDE	LAMBDA-CYHALOTHRIN
XENTARI WG	BACILLUS THURINGIENSIS SSP. AIZAWAI
ZIVATA	LAMBDA-CYHALOTHRIN
Fungicides	
A15457 FUNGICIDE	BENZOVINDIFLUPYR
A18993 FUNGICIDE	BENZOVINDIFLUPYR PROPICONAZOLE
A19649 FUNGICIDE	PYDIFLUMETOFEN
A21573 FUNGICIDE	PYDIFLUMETOFEN PROPICONAZOLE
ACAPELA FUNGICIDE	PICOXYSTROBIN
ALLEGIANCE FL	METALAXYL
APRON XL LS	METALAXYL-M AND S-ISOMER
APROVIA TOP	BENZOVINDIFLUPYR DIFENOCONAZOLE
ASTOUND FUNGICIDE	CYPRODINIL FLUDIOXONIL
AVODIGEN	BACILLUS SUBTILIS STRAIN FMCH002 BACILLUS LICHENIFORMIS STRAIN FMCH001

Product Name	Active Name
AZOSHY 250 SC	AZOXYSTROBIN
AZOXY 250 SC	AZOXYSTROBIN
AZOXY FLOWABLE FUNGICIDE	AZOXYSTROBIN
AZOXYSTAR FUNGICIDE	AZOXYSTROBIN
BAS 500 F ST	PYRACLOSTROBIN
BAS 516 F ST	BOSCALID PYRACLOSTROBIN
BAS 720 F ST	FLUXAPYROXAD METALAXYL PYRACLOSTROBIN
BAS 752 RC	FLUXAPYROXAD MEFENTRIFLUCONAZOLE
BELMONT 2.7 FS	METALAXYL
BELYAN	FLUXAPYROXAD MEFENTRIFLUCONAZOLE PYRACLOSTROBIN
BUMPER 418 EC	PROPICONAZOLE
BUMPER 432 EC	PROPICONAZOLE
CEREFIT A FUNGICIDE	PICOXYSTROBIN
CO-OP PIVOT	PROPICONAZOLE
COTEGRA FUNGICIDE	BOSCALID PROTHIOCONAZOLE
DOUBLE NICKEL 55	BACILLUS AMYLOLIQUEFACIENS, STRAIN D747
DPX-YT669 250FS FUNGICIDE SEED TREATMENT	PICOXYSTROBIN
DYAX	FLUXAPYROXAD PYRACLOSTROBIN
DYNASTY 100FS FUNGICIDE	AZOXYSTROBIN
EMISSARIUS FUNGICIDE	AZOXYSTROBIN
EVERGOL ACTIV	METALAXYL PENFLUFEN TRIFLOXYSTROBIN
EVITO 480 SC FUNGICIDE	FLUOXASTROBIN
EXEMPLA	AZOXYSTROBIN DIFENOCONAZOLE
F2971AA FUNGICIDE	FLUOXASTROBIN TETRACONAZOLE
FITNESS FUNGICIDE	PROPICONAZOLE
FLUOPYRAM 600FS	FLUOPYRAM
FLUOPYRAM 600FS CANOLA	FLUOPYRAM
FPY/PTZ FUNGICIDE	FLUOPYRAM PROTHIOCONAZOLE
HEADLINE EC FUNGICIDE	PYRACLOSTROBIN

Product Name	Active Name
HELIX VIBRANCE	DIFENOCONAZOLE FLUDIOXONIL METALAXYL-M AND S-ISOMER SEDAXANE THIAMETHOXAM
HOLDFAST	PROTHIOCONAZOLE
INSPIRE FUNGICIDE	DIFENOCONAZOLE
INTEGO SOLO FUNGICIDE	ETHABOXAM
INTEGO SUITE CANOLA SEED PROTECTANT	ETHABOXAM METCONAZOLE MANDESTROBIN METALAXYL
INTEGRAL	BACILLUS AMYLOLIQUEFACIENS STRAIN MBI600
INTUITY FUNGICIDE	MANDESTROBIN
IPCO PIVOT 418 EC	PROPICONAZOLE
ISOFETAMID 400SC FUNGICIDE	ISOFETAMID
KODIAK CONCENTRATE FUNGICIDE	BACILLUS SUBTILIS (STRAIN GB03)
KODIAK FLOWABLE FUNGICIDE	BACILLUS SUBTILIS (STRAIN GB03)
LALSTOP CONTANS WG	CONIOTHYRIUM MINITANS STRAIN CON/M/91-08
LANCE WDG FUNGICIDE	BOSCALID
LENVYOR	MEFENTRIFLUCONAZOLE
LUMIFLEX FUNGICIDE SEED TREATMENT	IPCONAZOLE
LUMISCEND	INPYRFLUXAM
MAXIM 480FS COLOURLESS SEED TREATMENT FUNGICIDE	FLUDIOXONIL
METCONAZOLE 50 WDG FUNGICIDE	METCONAZOLE
METLOCK FUNGICIDE	METCONAZOLE
METTLE 210 ME FUNGICIDE	TETRACONAZOLE
MIRAVIS BOLD FUNGICIDE	PYDIFLUMETOFEN
MODO FUNGICIDE	PROPICONAZOLE
MUSTGROW CROP BIOFUMIGANT	ORIENTAL MUSTARD SEED MEAL
NEXICOR	FLUXAPYROXAD PROPICONAZOLE PYRACLOSTROBIN
NIPSIT SUITE CANOLA SEED PROTECTANT	CLOTHIANIDIN METCONAZOLE METALAXYL
NUFARM PROPICONAZOLE FUNGICIDE	PROPICONAZOLE
PEN 240FS	PENFLUFEN
PENRED 240FS	PENFLUFEN
PENTHIOPYRAD FUNGICIDE SEED TREATMENT	PENTHIOPYRAD
PENTRIME	METALAXYL PENFLUFEN TRIFLOXYSTROBIN

Product Name	Active Name
PREACH FUNGICIDE	PYRACLOSTROBIN
PRIAXOR	FLUXAPYROXAD PYRACLOSTROBIN
PRINCETON FUNGICIDE	PROPICONAZOLE
PROLINE 480 SC FOLIAR FUNGICIDE	PROTHIOCONAZOLE
PROLINE GOLD	FLUOPYRAM PROTHIOCONAZOLE
PROPEL FUNGICIDE	PROPICONAZOLE
PROPI SUPER 25 EC	PROPICONAZOLE
PROPULSE	FLUOPYRAM PROTHIOCONAZOLE
PROSPER EVERGOL SEED TREATMENT	CLOTHIANIDIN METALAXYL PENFLUFEN TRIFLOXYSTROBIN
PROSPER FX	CLOTHIANIDIN METALAXYL TRIFLOXYSTROBIN CARBATHIIN
PROSPER T 200	CLOTHIANIDIN METALAXYL TRIFLOXYSTROBIN CARBATHIIN
PYR FLU FORM 1 FUNGICIDE	FLUXAPYROXAD PYRACLOSTROBIN
QST713 LIQUID	BACILLUS SUBTILIS (STRAIN QST 713)
QUADRIS FLOWABLE FUNGICIDE	AZOXYSTROBIN
QUASH FUNGICIDE	METCONAZOLE
QUASH SC FUNGICIDE	METCONAZOLE
QUASI FUNGICIDE	AZOXYSTROBIN
QUILT FUNGICIDE	AZOXYSTROBIN PROPICONAZOLE
RANCONA 3.8 FS FUNGICIDE	IPCONAZOLE
RANCONA V RS FUNGICIDE	IPCONAZOLE CARBATHIIN
RELENYA	MEFENTRIFLUCONAZOLE
ROXAR FUNGICIDE	TETRACONAZOLE
S-2200 3.2 FS FUNGICIDE	MANDESTROBIN
S-2200 4 SC FUNGICIDE	MANDESTROBIN
SALTRO	PYDIFLUMETOFEN
SERENADE ASO	BACILLUS SUBTILIS (STRAIN QST 713)
SERENADE MAX	BACILLUS SUBTILIS (STRAIN QST 713)
SERENADE OPTI	BACILLUS SUBTILIS (STRAIN QST 713)
SERENADE SOIL	BACILLUS SUBTILIS (STRAIN QST 713)

Product Name	Active Name
SHARDA FUNGTION SC	AZOXYSTROBIN PROPICONAZOLE
SORADUO A	PROTHIOCONAZOLE
SORATEL	PROTHIOCONAZOLE
STARGUS BIOFUNGICIDE	BACILLUS AMYLOLIQUEFACIENS STRAIN F727
SUPER AZOXY FUNGICIDE	AZOXYSTROBIN
TELEX FUNGICIDE	METALAXYL-M AND S-ISOMER
TILT 250E	PROPICONAZOLE
TRILEX FS SEED TREATMENT FUNGICIDE	TRIFLOXYSTROBIN
VELTYMA	MEFENTRIFLUCONAZOLE PYRACLOSTROBIN
VERCORAS F3 SEED TREATMENT	FLUXAPYROXAD METALAXYL PYRACLOSTROBIN
VERCORAS XC SEED TREATMENT	FLUOPYRAM
VERTISAN FUNGICIDE	PENTHIOPYRAD
VIBRANCE 500FS SEED TREATMENT	SEDAXANE
VIBRANCE FLEXI CANOLA	DIFENOCONAZOLE FLUDIOXONIL METALAXYL-M AND S-ISOMER SEDAXANE
WEED AWAY PIVOT 418 EC	PROPICONAZOLE
XEMIUM 325 FUNGICIDE SEED TREATMENT	FLUXAPYROXAD
XEMIUM EC FUNGICIDE	FLUXAPYROXAD
XEMIUM SC FOLIAR FUNGICIDE	FLUXAPYROXAD
ZELTERA FUNGICIDE	INPYRFLUXAM
ZOLERA FX FUNGICIDE	FLUOXASTROBIN TETRACONAZOLE
ZOLERA ODX FUNGICIDE	FLUOXASTROBIN TETRACONAZOLE
ZOXY FUNGICIDE	AZOXYSTROBIN



# TABLE 2.

## ACTIVE INGREDIENT POLLINATOR PRECAUTION LEVELS

Table 2 lists active ingredients registered for use in canola (as of January 2023) in Canada and their corresponding pollinator precaution levels based on the PMRA risk characterization framework: ‘Most restrictive pollinator precaution’, ‘Moderately restrictive pollinator precaution’, and ‘Least restrictive pollinator precaution’ (see Table 3). Pesticide active ingredients are listed alphabetically under the insecticide and fungicide sections of the table.

Active ingredient registrations frequently change and new information may change their precaution level.

In addition to formulation and application method, rate and timing, the actual risk to bees may be affected by other factors, as discussed in this guide. Further information, including special precautions for wild and native bee species, and pertinent research are included in the column titled “Additional Information (where available)”. Also note that the pesticide mode of action (MoA) needs to be considered as part of an overall crop protection plan in order to avoid products becoming ineffective due to pest resistance. Information for MoA can be found at: <http://www.irac-online.org/modes-of-action/>

**LABEL SEARCH**

In addition to using this table to look up pollinator precaution levels, the PMRA has a tool called the ‘Pesticide Label Search’ which allows the user to either download an app to access product labels from their mobile device or to use the online [label search tool](#).

**Disclaimer**

The Pest Management Regulatory Agency and Pollinator Partnership Canada neither endorse these products nor intend to discriminate against products not mentioned. Some of the pesticides listed may not be registered for use in your province. It is the user’s responsibility to check the registration status of any material and any provincial restrictions before use.

**PRE-MIXES**

Many pre-mixed products have entered the market containing multiple active ingredients. Refer to the pesticide label for pollinator precautions or use Table 1 to look up each active ingredient separately.

**KEY TO ABBREVIATIONS USED IN TABLE 2**

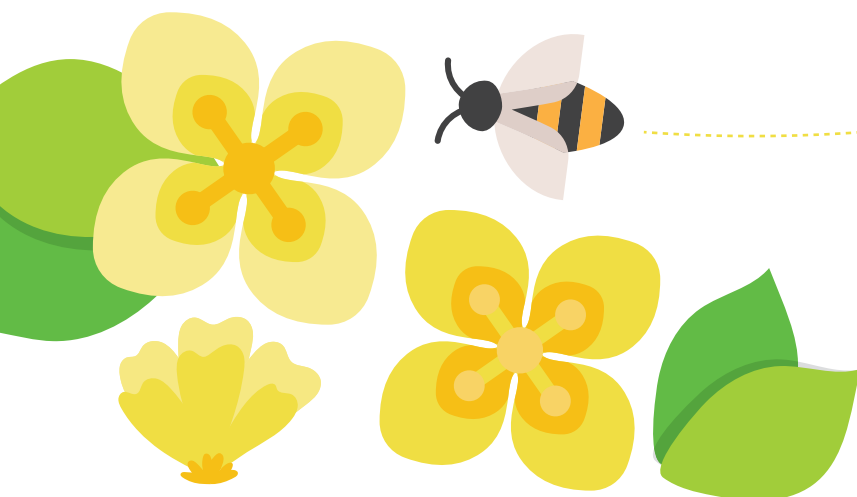
**RT** Residual Time. The length of time the residues of the product remain toxic to bees after application.

**ERT** Extended Residual Toxicity. Residues are expected to cause at least 25% mortality for longer than 8 hours after application.

Active Ingredient	Most Restrictive	Moderately Restrictive	Least Restrictive	Additional Information (Where Available)
<b>Insecticides</b>				
ACETAMIPRID		X		2 day ERT to bumble bees <sup>1</sup> . Cyano group neonicotinoids exhibit lower toxicity to bees than nitro group neonicotinoids <sup>2</sup> .
AUTOGRAPHA CALIFORNICA NUCLEOPOLYHEDROVIRUS FV11			X	
BACILLUS LICHENIFORMIS STRAIN FMCH001			X	
BACILLUS SUBTILIS STRAIN FMCH002			X	
BACILLUS SUBTILIS (STRAIN QST 713)			X	Laboratory tests suggest potential effects on bumble bees <sup>3</sup> .
BACILLUS THURINGIENSIS SSP. AIZAWAI		X		
BACILLUS THURINGIENSIS SUBSPECIES KURSTAKI (ALL STRAINS)			X	
CARBARYL	X			Carbaryl has ERT to all bees including alfalfa leafcutting bees <sup>4</sup> and bumble bees <sup>1</sup> .
CHLORANTRANILIPROLE			X	
CLOTHIANIDIN	X			
CYANTRANILIPROLE		X		
CYPERMETHRIN	X			
DELTAMETHRIN		X		>8 hours RT for alfalfa leafcutting bees <sup>4</sup> . Formulated products may have a repellent effect lasting 2-3 hours <sup>5</sup> . 2 days ERT for bumble bees <sup>1</sup>
DIFENOCONAZOLE			X	Can synergize with cyprodinil to cause learning difficulties in honey bees <sup>4</sup>
DIMETHOATE	X			ERT to alfalfa leafcutting bees <sup>4</sup> . Do not place alfalfa leafcutting bee nest shelters into fields until at least 1 week after treatment <sup>1</sup> .
FERRIC PHOSPHATE			X	
FLUDIOXONIL			X	
FLUPYRADIFURONE		X		Toxic to adult bees in laboratory studies via oral exposure, however, not toxic to bees through contact exposure, and field studies conducted with this product have shown no effects on honeybee colony development <sup>6</sup> .
IMIDACLOPRID	X			Bumble bees may be more sensitive to imidacloprid than honey bees <sup>7</sup> .



Active Ingredient	Most Restrictive	Moderately Restrictive	Least Restrictive	Additional Information (Where Available)
IRON (PRESENT AS FERRIC PHOSPHATE)			X	
LAMBDA-CYHALOTHRIN		X		May be more toxic to bees when mixed with propiconazole. > 1 day ERT for alfalfa leafcutting bees <sup>4</sup> .
MALATHION	X			Up to 7 days ERT for alfalfa leafcutting bees <sup>4</sup> .
METALAXYL			X	
METALAXYL-M AND S-ISOMER			X	
METCONAZOLE			X	
ORIENTAL MUSTARD SEED MEAL			X	
PENFLUFEN			X	
PERMETHRIN	X			Up to 3 days ERT for alfalfa leafcutting bees. May be repellent in arid conditions <sup>4</sup> .
POTASSIUM SALTS OF FATTY ACIDS			X	Non-target insects in flightless stage are vulnerable <sup>8</sup> .
PYDIFLUMETOFEN			X	
SEDAXANE			X	
SULFOXAFLOX	X			
THIAMETHOXAM	X			Thiamethoxam is often used as a systemic insecticide, and has been found in pollen and nectar of plants <sup>2,9</sup> . Documented incidents have demonstrated some degree of hazard with these treatments <sup>9,10</sup> . Bumble bees may be more sensitive to neonicotinoids than honey bees <sup>7</sup> .
TRIFLOXYSTROBIN			X	



Active Ingredient	Most Restrictive	Moderately Restrictive	Least Restrictive	Additional Information (Where Available)
<b>Fungicides</b>				
AZOXYSTROBIN			X	
BACILLUS AMYLOLIQUEFACIENS STRAIN F727			X	
BACILLUS AMYLOLIQUEFACIENS STRAIN MBI600			X	
BACILLUS AMYLOLIQUEFACIENS, STRAIN D747			X	
BACILLUS LICHENIFORMIS STRAIN FMCH001			X	
BACILLUS SUBTILIS (STRAIN GB03)			X	
BACILLUS SUBTILIS (STRAIN QST 713)			X	Laboratory tests suggest potential effects on bumble bees <sup>3</sup> .
BACILLUS SUBTILIS STRAIN FMCH002			X	
BENZOVINDIFLUPYR			X	
BOSCALID			X	Boscalid will also increase the toxicity of insecticide seed treatments to honey bees <sup>11</sup> .
CARBATHIIN			X	
CLOTHIANIDIN	X			
CONIOTHYRIUM MINITANS STRAIN CON/M/91-08			X	
CYPRODINIL			X	
DIFENOCONAZOLE			X	Can synergize with cyprodinil to cause learning difficulties in honey bees <sup>4</sup> .
ETHABOXAM			X	
FLUDIOXONIL			X	
FLUOPYRAM			X	
FLUOXASTROBIN			X	
FLUXAPYROXAD			X	
INPYRFLUXAM			X	
IPCONAZOLE			X	
ISOFETAMID			X	
MANDESTROBIN			X	
MEFENTRIFLUCONAZOLE			X	
METALAXYL			X	
METALAXYL-M AND S-ISOMER			X	
METCONAZOLE			X	
ORIENTAL MUSTARD SEED MEAL			X	
PENFLUFEN			X	
PENTHIOPYRAD			X	
PICOXYSTROBIN			X	

Active Ingredient	Most Restrictive	Moderately Restrictive	Least Restrictive	Additional Information (Where Available)
PROPICONAZOLE			X	Mason bees more sensitive than honey bees <sup>12</sup> . If mixed with lambda-cyhalothrin, may increase toxicity <sup>13</sup> .
PROTHIOCONAZOLE			X	
PYDIFLUMETOFEN			X	
PYRACLOSTROBIN			X	
SEDAXANE			X	
TETRACONAZOLE			X	
TRIFLOXYSTROBIN			X	
TRIFLOXYSTROBIN			X	

## TABLE 3.

# POLLINATOR PRECAUTION LEVELS

Table 3 provides some of the considerations used by the PMRA to define the pollinator precaution levels.

This table is not specific to canola but rather shows how pesticide risk to pollinators is characterized for any active ingredient.

Three pollinator precaution levels are described here and correspond to the categories in Table 2 of this document. Always refer to label directions when applying pesticides as restrictions are specific to products and crops and are essential for minimizing harm to bees.

	<b>MOST RESTRICTIVE</b>	<b>MODERATELY RESTRICTIVE</b>	<b>LEAST RESTRICTIVE</b>
	<b>Typically requires the most restrictive precautions, with greater restrictions for applications to highly bee-attractive crops</b>	<b>Typically requires some restrictions on application to bee-attractive crops</b>	<b>Typically requires minimal or no restrictions</b>
<b>Acute adult contact/oral toxicity</b>	Typically highly toxic with an acute toxicity LD50 of < 2 µg/bee. Some pesticides may be highly toxic but have moderately restrictive labels due to short residual toxicity.	Typically moderately toxic with an acute toxicity LD50 of > 2 µg/bee to < 10.9 µg/bee. Note that some pesticides may be highly toxic but have moderately restrictive labels due to short residual toxicity.	Typically practically non-toxic with an acute toxicity LD50 of ≥ 11 µg/bee.
<b>Larval toxicity</b>	May have larval toxicity.	May have larval toxicity.	Typically none.
<b>Chronic toxicity</b>	May have chronic toxicity.	May have chronic toxicity.	Typically none.
<b>Residual toxicity</b>	Typically greater than 8 hours.	Typically 2 to 8 hours.	Typically no residual toxicity.

<b>Higher tier studies</b>	Available higher tier studies may indicate longer residual toxicity and a potential for effects even when exposure to residues occurs well after application (typically one to several days after application).	Available higher tier studies may indicate shorter residual toxicity and a potential for effects only when exposure to residues occurs shortly after application.	Higher tier studies are not typically required for low toxicity compounds; however, in some cases information may be available. Available higher tier studies would indicate a negligible potential for effects.
<b>Crop pollinator attractiveness</b>	Highly attractive crops require the most restrictive precautions, whereas crops with low or moderate attractiveness may require less restrictive statements.	Restrictions are similar for crops with high, moderate, and low crop attractiveness, and greater restrictions for highly attractive crops are not typically required.	No or minimal restrictions for crops with high, moderate, and low crop attractiveness.
<b>Bloom in relation to harvest</b>	Crops harvested after bloom would have restrictive statements.	Crops harvested after bloom may have restrictive statements.	Minimal or no restrictions whether crops harvested before or after bloom.
<b>Examples of restrictions</b>	<p>For highly bee-attractive crops, may not allow application during bloom.</p> <p>For moderately/low bee-attractive crops, avoid application during bloom but if necessary evening application may be allowed.</p> <p>May restrict pre-bloom application timing (i.e., certain systemic products; foliar or soil application methods).</p> <p>May be required to remove flowering weeds or groundcover prior to application (for example in orchards, or in turf lawns).</p> <p>Minimize spray drift.</p>	<p>For highly and moderately/low bee-attractive crops, avoid application during bloom but if necessary evening application may be allowed.</p> <p>Minimize spray drift.</p>	Typically requires minimal or no restrictions.

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