

SUPPLEMENT

to Protecting pollinators
from pesticides

CUCURBIT CROPS



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HOW TO USE THIS DOCUMENT

This supplement to *Protecting Pollinators From Pesticides Cucurbit* contains information on the pesticide regulatory process of the Pest Management Regulatory Agency (PMRA) and precautionary levels for pesticide products used in cucurbit 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.

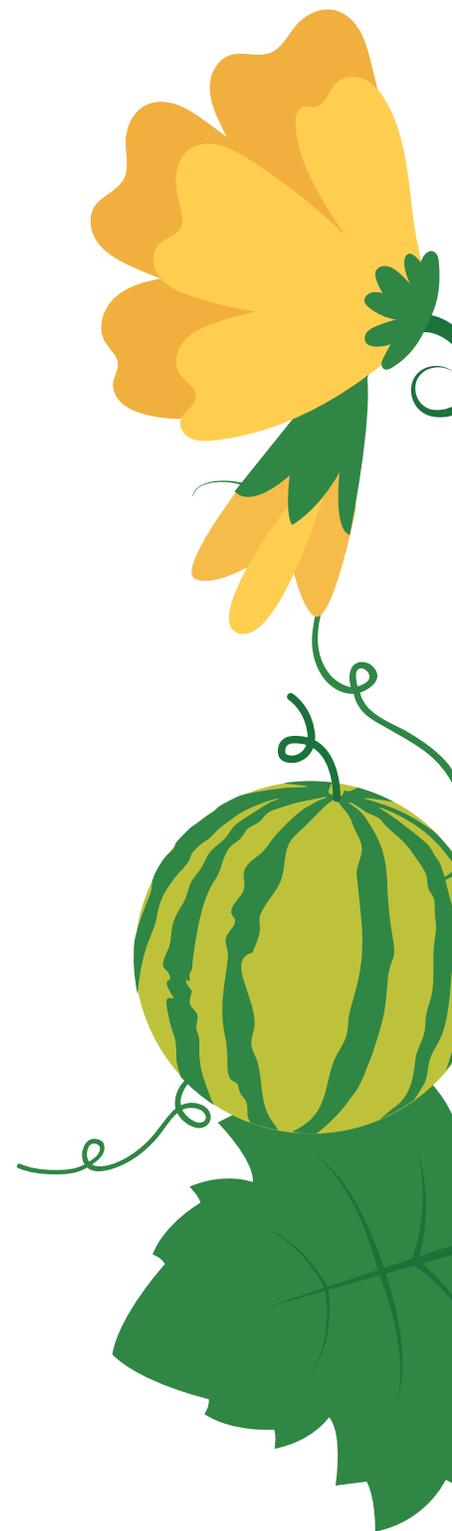
UNDERSTANDING POLLINATOR TOXICITY, EXPOSURE, AND RISK



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*¹.

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.)². 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 beyond honey bees.

¹ 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.

² 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 cucurbit 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 cucurbit in January 2021. For the most current product registration, use the PMRA's label search.

Product Name	Active Name
Insecticide	
ACRAMITE 50WS MITICIDE	BIFENAZATE
ADMIRE 240 FLOWABLE SYSTEMIC INSECTICIDE	IMIDACLOPRID
ALIAS 240 SC SYSTEMIC INSECTICIDE	IMIDACLOPRID
AVID 1.9% EC MITICIDE INSECTICIDE	ABAMECTIN
BELEAF 50SG INSECTICIDE	FLONICAMID
BIOPROTEC 3P DRY FLOWABLE BIOLOGICAL INSECTICIDE	BACILLUS THURINGIENSIS SUBSPECIES KURSTAKI (ALL STRAINS)
BIOPROTEC CAF	BACILLUS THURINGIENSIS SUBSPECIES KURSTAKI (ALL STRAINS)
BIOPROTEC ECO	BACILLUS THURINGIENSIS SUBSPECIES KURSTAKI (ALL STRAINS)
BIOPROTEC PLUS	BACILLUS THURINGIENSIS SUBSPECIES KURSTAKI (ALL STRAINS)
BRIMSTONE DF	SULPHUR
BTK - BIOINSECTICIDE	BACILLUS THURINGIENSIS SUBSPECIES KURSTAKI (ALL STRAINS)
BUSAN 1020	METAM-SODIUM OR SODIUM METHYLDITHIOCARBAMATE
BUSAN 1180	METAM-POTASSIUM OR POTASSIUM METHYLDITHIOCARBAMATE
BUSAN 1236	METAM-SODIUM OR SODIUM METHYLDITHIOCARBAMATE
BUZZ-UP! HOUSE & GARDEN INSECT KILLER	PIPERONYL BUTOXIDE PYRETHRINS
BYI 02960 200SL INSECTICIDE	FLUPYRADIFURONE
CHLOROPICRIN 100 LIQUID SOIL FUMIGANT	CHLOROPICRIN
CLOTHIANIDIN INSECTICIDE	CLOTHIANIDIN
CLUTCH 50 WDG INSECTICIDE	CLOTHIANIDIN
CORAGEN INSECTICIDE	CHLORANTRANILIPROLE
COSAVET DF EDGE	SULPHUR
CYCLANILIPROLE 50SL INSECTICIDE	CYCLANILIPROLE

Product Name	Active Name
DANITOL INSECTICIDE	FENPROPATHRIN
DE LABS DX13	SILICON DIOXIDE (PRESENT AS 100% DIATOMACEOUS EARTH) - FRESH WATER FOSSILS
DIBROM	NALED
DISTANCE	PYRIPROXYFEN
DOKTOR DOOM GO GREEN PREMIUM QUALITY PYRETHRIN INSECTICIDE POWDER	PIPERONYL BUTOXIDE PYRETHRINS
DOKTOR DOOM FORMULA 420 3-IN-1 CROP & PLANT RESCUE CONCENTRATE	CANOLA OIL
DOKTOR DOOM FORMULA 420 3-IN-1 CROP & PLANT RESCUE READY-TO-SPRAY	CANOLA OIL
DOKTOR DOOM FORMULA 420 FLOWER POWER INSECT KILLER CONCENTRATE	PYRETHRINS
DOKTOR DOOM FORMULA 420 FLOWER POWER INSECT KILLER READY-TO-USE	PYRETHRINS
DOKTOR DOOM FORMULA 420 PROFESSIONAL USE 3-IN-1 CROP & PLANT RESCUE CONCENTRATE	CANOLA OIL
DOKTOR DOOM MULTI-PURPOSE INSECTICIDE SPRAY	PIPERONYL BUTOXIDE PYRETHRINS
DOKTOR DOOM PREMIUM 3 IN 1 CROP & PLANT RESCUE CONCENTRATE	CANOLA OIL
DOUBLE DOWN SPRAY OIL	MINERAL OIL
DX13 DUST	SILICON DIOXIDE (PRESENT AS 100% DIATOMACEOUS EARTH) - FRESH WATER FOSSILS
DYNO-MITE SC MITICIDE/INSECTICIDE	PYRIDABEN
EMZONE PYROCIDE HOUSE AND GARDEN INSECT KILLER	PIPERONYL BUTOXIDE PYRETHRINS
ENDEAVOR 50WG INSECTICIDE	PYMETROZINE
EXIREL INSECTICIDE	CYANTRANILIPROLE
FERRAMOL SLUG AND SNAIL BAIT	IRON (PRESENT AS FERRIC PHOSPHATE)
FLORAMITE SC MITICIDE	BIFENAZATE
FORAY 48BA BIOLOGICAL INSECTICIDE AQUEOUS SUSPENSION	BACILLUS THURINGIENSIS SUBSPECIES KURSTAKI (ALL STRAINS)
FORBID 240 SC INSECTICIDE/MITICIDE	SPIROMESIFEN
FPY 500	FLUOPYRAM
FYFANON 50% EC EMULSIFIABLE CONCENTRATE INSECTICIDE	MALATHION
GENERAL HYDROPONICS EXILE	POTASSIUM SALTS OF FATTY ACIDS
GENERAL HYDROPONICS SUFFOCOAT	CANOLA OIL
GO GREEN DOKTOR DOOM BOTANICS PLANT SPRAY	PYRETHRINS
GO GREEN DOKTOR DOOM INDOOR OUTDOOR INSECTICIDE SPRAY	PIPERONYL BUTOXIDE PYRETHRINS
GO GREEN DOKTOR DOOM SPIDER MITE KNOCKOUT	PIPERONYL BUTOXIDE PYRETHRINS

Product Name	Active Name
HARVANTA 50SL INSECTICIDE	CYCLANILIPROLE
HYDROWORXX INSECTICIDE/MITICIDE CONCENTRATE	PYRETHRINS
INTERCEPT 60 WP	IMIDACLOPRID
INTREPID INSECTICIDE	METHOXYFENOZIDE
KANEMITE 15 SC MITICIDE	ACEQUINOCYL
K-G BOTANIC PLANT INSECT SPRAY	PYRETHRINS
K-G HOUSE & GARDEN INSECT KILLER I	PIPERONYL BUTOXIDE PYRETHRINS
K-G MULTI PURPOSE INSECTICIDE SPRAY II	PIPERONYL BUTOXIDE PYRETHRINS
KNOCK DOWN BOTANICAL HOUSE PLANT & GARDEN INSECT KILLER	PYRETHRINS
KNOCK DOWN INDOOR AND PLANT MAX FLYING & CRAWLING INSECT KILLER (0.25 PYRETHRIN FROM CHRYSANTHEMUM FLOWER PYRETHRUM)	PIPERONYL BUTOXIDE PYRETHRINS
KNOCK DOWN POT-IT HOUSE PLANT & GARDEN INSECT KILLER (BOTANICAL)	PYRETHRINS
KNOCK DOWN TOTAL HOME & INDOOR GARDEN INSECT KILLER (0.25 PYRETHRINS FROM CHRYSANTHEMUM FLOWER PYRETHRUM)	PIPERONYL BUTOXIDE PYRETHRINS
KNOCK DOWN ₂ POT-IT HOUSE PLANT & GARDEN INSECT KILLER (BOTANICAL) I	PYRETHRINS
KONK HOUSE & GARDEN BUG KILLER	PIPERONYL BUTOXIDE PYRETHRINS
KOPA INSECTICIDAL SOAP	POTASSIUM SALTS OF FATTY ACIDS
KUMULUS DF WATER DISPERSIBLE GRANULAR FUNGICIDE AND ACARICIDE	SULPHUR
LABAMBA INSECTICIDE	LAMBDA-CYHALOTHRIN
LOOPEX	AUTOGRAPHA CALIFORNICA NUCLEOPOLYHEDROVIRUS FV11
LOOPEX FC	AUTOGRAPHA CALIFORNICA NUCLEOPOLYHEDROVIRUS FV11
MALATHION 500 EMULSIFIABLE CONCENTRATE INSECTICIDE	MALATHION
MALATHION 85E	MALATHION
MATADOR 120 EC EMULSIFIABLE CONCENTRATE INSECTICIDE	LAMBDA-CYHALOTHRIN
MERIT 60 WP GREENHOUSE AND NURSERY INSECTICIDE	IMIDACLOPRID
MET52 EC BIOINSECTICIDE	METARHIZIUM ANISOPLIAE (STRAIN F52)
MICROSCOPIC SULPHUR WETTABLE POWDER FUNGICIDE	SULPHUR
MINECTO PRO	ABAMECTIN CYANTRANILIPROLE
MOVENTO 150 OD INSECTICIDE	SPIROTETRAMAT
MOVENTO 240 SC INSECTICIDE	SPIROTETRAMAT
MUSTGROW CROP BIOFUMIGANT	ORIENTAL MUSTARD SEED MEAL

Product Name	Active Name
NEU1161I RTU INSECTICIDE/MITICIDE	PYRETHRINS
NEU1161I RTU WITH PULLN SPRAY APPLICATOR INSECTICIDE / MITICIDE	PYRETHRINS
NEU1161I RTU WITH QUICK CONNECT SPRAYER INSECTICIDE / MITICIDE	PYRETHRINS
NEU1161I WITH APPLICATOR	SPINOSAD
NEUDORFF ANT AND INSECT BAIT	POTASSIUM SALTS OF FATTY ACIDS
NEUDOSAN COMMERCIAL	FLUENSULFONE
NIMITZ 480EC	SPIROMESIFEN
OBERON FLOWABLE INSECTICIDE-MITICIDE	POTASSIUM SALTS OF FATTY ACIDS
ORTHO BUG B GON ECO INSECTICIDE CONCENTRATE	PYRETHRINS
PERM-UP EMULSIFIABLE CONCENTRATE INSECTICIDE	PERMETHRIN
PIC PLUS FUMIGANT	CHLOROPICRIN
POUNCE 384 EC INSECTICIDE	PERMETHRIN
PRO PROFESSIONAL ANT AND ROACH PYRODUST	PIPERONYL BUTOXIDE PYRETHRINS
PURESPRAY GREEN SPRAY OIL 13E	MINERAL OIL
PYLON MITICIDE-INSECTICIDE	CHLORFENAPYR
QST713 LIQUID	BACILLUS SUBTILIS (STRAIN QST 713)
SAFER'S BTK BIOLOGICAL INSECTICIDE	BACILLUS THURINGIENSIS SUBSPECIES KURSTAKI (ALL STRAINS)
SAFER'S END-ALL INSECTICIDE/MITICIDE	PYRETHRINS
SAFER'S END-ALL INSECTICIDE/MITICIDE CONCENTRATE	PYRETHRINS
SAFER'S TOMATO & VEGETABLE INSECTICIDE RTU	PIPERONYL BUTOXIDE PYRETHRINS
SAFER'S VEGETABLE GARDEN INSECTICIDE	PYRETHRINS POTASSIUM SALTS OF FATTY ACIDS
SANMITE. MITICIDE/INSECTICIDE	PYRIDABEN
SCORPIO ANT AND INSECT BAIT	SPINOSAD
SEVIN XLR CARBARYL INSECTICIDE LIQUID SUSPENSION	CARBARYL
SHUTTLE 15 SC MITICIDE	ACEQUINOCYL
SIVANTO PRIME INSECTICIDE	FLUPYRADIFURONE
SLUGGO PROFESSIONAL SLUG AND SNAIL BAIT	FERRIC PHOSPHATE
SUFFOIL-X	MINERAL OIL
SUPERIOR MALATHION LIQUID INSECTICIDE-MITICIDE CONCENTRATE	MALATHION
SURROUND. WP CROP PROTECTANT	KAOLIN
VEGOL CROP OIL	CANOLA OIL
VEGOL INSECTICIDAL OIL	CANOLA OIL
VEGOL READY-TO-SPRAY	CANOLA OIL
VEGOL SINGLE DOSE INSECTICIDAL OIL	CANOLA OIL
VELIFER	BEAUVERIA BASSIANA STRAIN PPRI 5339

Product Name / Insecticide Products	Active Name
VELUM PRIME	FLUOPYRAM
VENDEX (R) 50W WETTABLE POWDER MITICIDE	FENBUTATIN OXIDE
VENDEX 50WP MITICIDE	FENBUTATIN OXIDE
VERSYS INSECTICIDE	AFIDOPYROPEN
VOLIAM XPRESS Insecticide	LAMBDA-CYHALOTHRIN CHLORANTRANILIPROLE
WARRIOR INSECTICIDE	LAMBDA-CYHALOTHRIN
XenTari WG	BACILLUS THURINGIENSIS SSP. AIZAWAI
Fungicides	
A15457 FUNGICIDE	BENZOVINDIFLUPYR
A20259 FUNGICIDE	DIFENOCONAZOLE PYDIFLUMETOFEN
A21723E	METALAXYL-M AND S-ISOMER OXATHIPIPROLIN
ACTINOVATE AG FUNGICIDE	STREPTOMYCES LYDICUS STRAIN WYEC108
ACTINOVATE SP FUNGICIDE	STREPTOMYCES LYDICUS STRAIN WYEC108
AGROSOLAN LIQUID FUNGICIDE	MANCOZEB
ALLEGRO 500F AGRICULTURAL FUNGICIDE	FLUAZINAM
APROVIA FUNGICIDE	BENZOVINDIFLUPYR
APROVIA TOP	BENZOVINDIFLUPYR DIFENOCONAZOLE
ASPERELLO T34 BIOCONTROL	TRICHODERMA ASPERELLUM, STRAIN T34
BAD747 LC	BACILLUS AMYLOLIQUEFACIENS, STRAIN D747
BAD747 WG	BACILLUS AMYLOLIQUEFACIENS, STRAIN D747
BCP1100-02 FUNGICIDE	MONO- AND DIBASIC SODIUM, POTASSIUM, AND AMMONIUM PHOSPHITES
BIOPROTEC FUNGICIDE AND BACTERICIDE TOMATO AND VEGETABLE GARDEN	CITRIC ACID LACTIC ACID
BIOPROTEC FUNGICIDE AND BACTERICIDE TOMATO AND VEGETABLE GARDEN READY TO USE	CITRIC ACID LACTIC ACID
BIOTAK	BACILLUS AMYLOLIQUEFACIENS STRAIN MBI600
BRAVO ZNC	CHLOROTHALONIL
BRAVO 720	CHLOROTHALONIL
BRAVO WEATHERSTIK	CHLOROTHALONIL
BRAVO ZN AGRICULTURAL FUNGICIDE	CHLOROTHALONIL
BRIMSTONE DF	SULPHUR
BURAN	GARLIC POWDER
BUSAN 1020	METAM-SODIUM OR SODIUM METHYLDITHIOCARBAMATE
BUSAN 1180	METAM-POTASSIUM OR POTASSIUM METHYLDITHIOCARBAMATE
BUSAN 1236	METAM-SODIUM OR SODIUM METHYLDITHIOCARBAMATE
CABRIO EG FUNGICIDE	PYRACLOSTROBIN
CANTUS WDG FUNGICIDE	BOSCALID
CAPTAN 50 WP FUNGICIDE	CAPTAN

Product Name	Active Name
CAPTAN 80 DF FUNGICIDE	CAPTAN
CAPTAN 80 WSP FUNGICIDE	CAPTAN
CGA279202 50WG FUNGICIDE	TRIFLOXYSTROBIN
CHLOROPICRIN 100 LIQUID SOIL FUMIGANT	CHLOROPICRIN
CONFINE EXTRA FUNGICIDE	MONO- AND DI-POTASSIUM SALT OF PHOSPHOROUS ACID
COPPER 53W	COPPER, PRESENT AS BASIC COPPER SULFATE
COPPER SPRAY FUNGICIDE	COPPER (PRESENT AS COPPER OXYCHLORIDE)
COPPERCIDE WP FUNGICIDE	COPPER (PRESENT AS COPPER HYDROXIDE)
COPPERCIDE XLR FUNGICIDE	COPPER (PRESENT AS COPPER HYDROXIDE)
COSAVET DF EDGE	SULPHUR
CUEVA RTU WITH QUICK CONNECT SPRAYER	COPPER (PRESENT AS COPPER OCTANOATE)
CUEVA COMMERCIAL	COPPER (PRESENT AS COPPER OCTANOATE)
CUEVA READY-TO-SPRAY	COPPER (PRESENT AS COPPER OCTANOATE)
CUEVA RTU	COPPER (PRESENT AS COPPER OCTANOATE)
CUEVA RTU WITH PULLN SPRAY APPLICATOR	COPPER (PRESENT AS COPPER OCTANOATE)
CUEVA RTU WITH QUICKPUMP APPLICATOR	COPPER (PRESENT AS COPPER OCTANOATE)
CUEVA RTU WITH WAND APPLICATOR	COPPER (PRESENT AS COPPER OCTANOATE)
CYAZOFAMID 400SC FUNGICIDE	CYAZOFAMID
CYCLONE	CITRIC ACID LACTIC ACID
CYPROFLU FUNGICIDE	CYPRODINILFLUDIOXONIL
DECREE 50 WDG FUNGICIDE	FENHEXAMID
DIPLOMAT 5SC FUNGICIDE	POLYOXIN D ZINC SALT
DITHANE RAINSHIELD FUNGICIDE	MANCOZEB
DOKTOR DOOM FORMULA 420 3-IN-1 CROP & PLANT RESCUE CONCENTRATE	CANOLA OIL
DOKTOR DOOM FORMULA 420 3-IN-1 CROP & PLANT RESCUE READY-TO-SPRAY	CANOLA OIL
DOKTOR DOOM FORMULA 420 FUNGICIDE CONCENTRATE	COPPER (PRESENT AS COPPER OCTANOATE)
DOKTOR DOOM FORMULA 420 FUNGICIDE READY-TO-USE (RTU)	COPPER (PRESENT AS COPPER OCTANOATE)
DOKTOR DOOM PREMIUM 3 IN 1 CROP & PLANT RESCUE CONCENTRATE	CANOLA OIL
DOUBLE DOWN SPRAY OIL	MINERAL OIL
DUPONT ZORVEC ENICADE FUNGICIDE	OXATHIPIPROLIN
DUPONT ZORVEC EPICALTRIN FUNGICIDE	OXATHIPIPROLIN
ECHO 720 AGRICULTURAL FUNGICIDE	CHLOROTHALONIL
ECHO 90WSP AGRICULTURAL FUNGICIDE	CHLOROTHALONIL
ECHO NP FUNGICIDE	CHLOROTHALONIL
ELATUS FUNGICIDE	AZOXYSTROBIN BENZOVINDIFLUPYR

Product Name	Active Name
ENFUSE K 690	METAM-POTASSIUM OR POTASSIUM METHYLDITHIOCARBAMATE
EXISTENS FUNGICIDE & BACTERICIDE FRUIT AND VEGGIE	CITRIC ACID LACTIC ACID
EXISTENS FUNGICIDE & BACTERICIDE ROSE AND VEGETABLE	CITRIC ACID LACTIC ACID
FLUOPICOLIDE 4 SC FUNGICIDE	FLUOPICOLIDE
FOLPAN 50WP (FOLPET) FUNGICIDE	FOLPET
FOLPAN 80 WDG FUNGICIDE	FOLPET
FOLTAX 50 WP	FOLPET
FONTELIS FUNGICIDE	PENTHIOPYRAD
FORUM FUNGICIDE	DIMETHOMORPH
FPY 500	FLUOPYRAM
GENERAL HYDROPONICS SUFFOCOAT	CANOLA OIL
GREEN EARTH BORDO COPPER SPRAY	COPPER, PRESENT AS BASIC COPPER SULFATE
GUARDSMAN COPPER OXYCHLORIDE 50	COPPER (PRESENT AS COPPER OXYCHLORIDE)
HOLDFAST	PROTHIOCONAZOLE
HYDROWORXX DISEASE CONTROL CONCENTRATE	COPPER (PRESENT AS COPPER OCTANOATE)
INFLUENCE LC	GARLIC POWDER
INITIUM SC FUNGICIDE	AMETOCTRADIN
INSPIRE FUNGICIDE	DIFENOCONAZOLE
INSPIRE SUPER FUNGICIDE	CYPRODINIL FLUDIOXONIL
KING ECO-WAY PTV POTATO, TOMATO & VEGETABLE FUNGICIDE SPRAY	COPPER, PRESENT AS BASIC COPPER SULFATE
KOCIDE 2000	COPPER (PRESENT AS COPPER HYDROXIDE)
KOCIDE 2000-O	COPPER (PRESENT AS COPPER HYDROXIDE)
KUMULUS DF WATER DISPERSIBLE GRANULAR FUNGICIDE AND ACARICIDE	SULPHUR
LACTO-SAN	CITRIC ACID LACTIC ACID
LUNA PRIVILEGE	FLUOPYRAM
LUNA PRIVILEGE GREENHOUSE	FLUOPYRAM
LUNA SENSATION	FLUOPYRAM TRIFLOXYSTROBIN
MAESTRO 80 WSP FUNGICIDE	CAPTAN
MANZATE DISPERSS	MANCOZEB
MANZATE PRO-STICK FUNGICIDE	MANCOZEB
MANZATE MAX	MANCOZEB
MEDALLION FUNGICIDE	FLUDIOXONIL

Product Name	Active Name
METAM SODIUM AGRICULTURAL	METAM-SODIUM OR SODIUM METHYLDITHIOCARBAMATE
METTLE 125 ME FUNGICIDE	TETRACONAZOLE
METTLE 210 ME FUNGICIDE	TETRACONAZOLE
MICROSCOPIC SULPHUR WETTABLE POWDER FUNGICIDE	SULPHUR
MICROTHIOL DISPERSS	SULPHUR
MILSTOP FOLIAR FUNGICIDE	POTASSIUM BICARBONATE
MIRACLE-GRO GARDEN DEFENSE GARDEN DISEASE CONTROL CONCENTRATE	COPPER (PRESENT AS COPPER OCTANOATE)
MIRACLE-GRO GARDEN DEFENSE GARDEN DISEASE CONTROL READY-TO-SPRAY	COPPER (PRESENT AS COPPER OCTANOATE)
MIRACLE-GRO GARDEN DEFENSE GARDEN DISEASE CONTROL READY-TO-USE	COPPER (PRESENT AS COPPER OCTANOATE)
MIRACLE-GRO GARDEN DEFENSE GARDEN DISEASE CONTROL READY-TO-USE WITH WAND APPLICATOR	COPPER (PRESENT AS COPPER OCTANOATE)
MIRAVIS DUO FUNGICIDE	DIFENOCONAZOLE PYDIFLUMETOFEN
MUSTGROW CROP BIOFUMIGANT	ORIENTAL MUSTARD SEED MEAL
MYCOSTOP BIOFUNGICIDE	STREPTOMYCES GRISEOVIRIDIS STRAIN K61
NATRIA DISEASE CONTROL READY TO USE	BACILLUS SUBTILIS (STRAIN QST 713)
NATRIA DISEASE CONTROL CONCENTRATE	BACILLUS SUBTILIS (STRAIN QST 713)
NOVA FUNGICIDE	MYCLOBUTANIL
ORONDIS FUNGICIDE	OXATHIPIPROLIN
ORONDIS GOLD FUNGICIDE	METALAXYL-M AND S-ISOMER OXATHIPIPROLIN
ORONDIS ULTRA A FUNGICIDE	MANDIPROPAMID
ORONDIS ULTRA FUNGICIDE	MANDIPROPAMID OXATHIPIPROLI
ORONDIS 200SC FUNGICIDE	OXATHIPIPROLIN
ORONDIS ULTRA B FUNGICIDE	OXATHIPIPROLIN
ORONDIS GOLD A 200SC	OXATHIPIPROLIN
ORONDIS GOLD B 480SL	METALAXYL-M AND S-ISOMER
OXIDATE	HYDROGEN PEROXIDE PEROXYACETIC ACID
OXIDATE 2.0	HYDROGEN PEROXIDE
OXIDATE FC	HYDROGEN PEROXIDE PEROXYACETIC ACID
PALLADIUM FUNGICIDE	CYPRODINIL FLUDIOXONIL
PARASOL FLOWABLE FUNGICIDE	COPPER (PRESENT AS COPPER HYDROXIDE)
PARASOL WETTABLE POWDER FUNGICIDE	COPPER (PRESENT AS COPPER HYDROXIDE)
PARASOL WG FUNGICIDE	COPPER (PRESENT AS COPPER HYDROXIDE)
PENNCOZEB 75DF FUNGICIDE	MANCOZEB
PENNCOZEB 75DF RAINCOAT FUNGICIDE	MANCOZEB

Product Name	Active Name
PHOSTROL FUNGICIDE	MONO- AND DIBASIC SODIUM, POTASSIUM, AND AMMONIUM PHOSPHITES
PHYTON 35 BACTERICIDE & FUNGICIDE	COPPER (PRESENT AS CUPRIC AMMONIUM FORMATE AND TANNATE COMPLEX)
PIC PLUS FUMIGANT	CHLOROPICRIN
POLYOXIN D ZINC SALT 5SC FUNGICIDE	POLYOXIN D ZINC SALT
POSTERITY FUNGICIDE	PYDIFLUMETOFEN
PRESIDIO FUNGICIDE	FLUOPICOLIDE
PRESTOP	FUNGUS: GLIOCLADIUM CATENULATUM
PRESTOP WG	FUNGUS: GLIOCLADIUM CATENULATUM
PREVICUR N AQUEOUS SOLUTION FUNGICIDE	PROPAMOCARB HYDROCHLORIDE
PRISTINE WG FUNGICIDE	BOSCALID PYRACLOSTROBIN
PROLINE 480 SC FOLIAR FUNGICIDE	PROTHIOCONAZOLE
PURESpray GREEN SPRAY OIL 13E	MINERAL OIL
QST713 LIQUID	BACILLUS SUBTILIS (STRAIN QST 713)
QUADRIS TOP	AZOXYSTROBIN DIFENOCONAZOLE
RAMPART FUNGICIDE	MONO- AND DI-POTASSIUM SALT OF PHOSPHOROUS ACID
REASON 500SC FUNGICIDE	FENAMIDONE
REGALIA LIQUID FUNGICIDE CONCENTRATE	EXTRACT OF REYNOUTRIA SACHALINENSIS
REGALIA LIQUID FUNGICIDE READY-TO-SPRAY	EXTRACT OF REYNOUTRIA SACHALINENSIS
REGALIA MAXX BIOFUNGICIDE LIQUID CONCENTRATE	EXTRACT OF REYNOUTRIA SACHALINENSIS
REVUS FUNGICIDE	MANDIPROPAMID
RHAPSODY ASO AN AQUEOUS SUSPENSION BIOFUNGICIDE	BACILLUS SUBTILIS (STRAIN QST 713)
RIDOMIL GOLD 480SL	METALAXYL-M AND S-ISOMER
ROOTSHIELD HC - BIOLOGICAL FUNGICIDE WETTABLE POWDER	TRICHODERMA HARZIANUM RIFAI STRAIN KRL-AG2
ROOTSHIELD PLUS G BIOLOGICAL FUNGICIDE	TRICHODERMA VIRENS STRAIN G-41 TRICHODERMA HARZIANUM RIFAI STRAIN KRL-AG2
ROOTSHIELD GRANULES BIOLOGICAL FUNGICIDE	TRICHODERMA HARZIANUM RIFAI STRAIN KRL-AG2
ROOTSHIELD PLUS WP - BIOLOGICAL FUNGICIDE	TRICHODERMA HARZIANUM RIFAI STRAIN KRL-AG2 TRICHODERMA VIRENS STRAIN G-41
ROOTSHIELD WP - BIOLOGICAL FUNGICIDE	TRICHODERMA HARZIANUM RIFAI STRAIN KRL-AG2
SCALA SC GREENHOUSE FUNGICIDE	PYRIMETHANIL
SERCADI FUNGICIDE	FLUXAPYROXAD
SERENADE OPTI	BACILLUS SUBTILIS (STRAIN QST 713)
SERENADE SOIL	BACILLUS SUBTILIS (STRAIN QST 713)
SERENADE MAX	BACILLUS SUBTILIS (STRAIN QST 713)
SERIFEL	BACILLUS AMYLOLIQUEFACIENS STRAIN MBI600
SHARDA CAPTAN 80 WSP	CAPTAN

Product Name	Active Name
STARGUS BIOFUNGICIDE	BACILLUS AMYLOLIQUEFACIENS STRAIN F727
SUFFOIL-X	MINERAL OIL
SUPRA CAPTAN 80 WSP FUNGICIDE	CAPTAN
TAEGRO 2 BIOFUNGICIDE	BACILLUS SUBTILIS VAR. AMYLOLIQUEFACIENS STRAIN FZB24
TATTOO FUNGICIDE	PROPAMOCARB HYDROCHLORIDE
TIMOREX GOLD BIOFUNGICIDE	TEA TREE OIL
TIVANO	CITRIC ACID LACTIC ACID
TORRENT 400SC AGRICULTURAL FUNGICIDE	CYAZOFAMID
TREORIS FUNGICIDE	PENTHIOPYRAD CHLOROTHALONIL
TRIANUM G BIOLOGICAL FUNGICIDE	TRICHODERMA HARZIANUM RIFAI STRAIN T-22
TRIANUM P BIOLOGICAL FUNGICIDE	TRICHODERMA HARZIANUM RIFAI STRAIN T-22
TURF-PHITE PRO FUNGICIDE	MONO- AND DI-POTASSIUM SALT OF PHOSPHOROUS ACID
VEGOL CROP OIL	CANOLA OIL
VEGOL INSECTICIDAL OIL	CANOLA OIL
VEGOL READY-TO-SPRAY	CANOLA OIL
VEGOL SINGLE DOSE INSECTICIDAL OIL	CANOLA OIL
VELUM PRIME	FLUOPYRAM
VIVANDO SC FUNGICIDE	METRAFENONE
WINFIELD PHOSPHITE EXTRA FUNGICIDE	MONO- AND DI-POTASSIUM SALT OF PHOSPHOROUS ACID
XEMIUM EC FUNGICIDE	FLUXAPYROXAD
XEMIUM SC FOLIAR FUNGICIDE	FLUXAPYROXAD
ZAMPRO FUNGICIDE	AMETOCTRADIN DIMETHOMORPH



TABLE 2.

ACTIVE INGREDIENT POLLINATOR PRECAUTION LEVELS

Table 2 lists active ingredients registered for use in cucurbit (as of January 2021) 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](#).

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.

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.

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)
Insecticides/Miticides				
ABAMECTIN	x			
ACEQUINOCYL			x	
AFIDOPYROPEN		x		
AUTOGRAPHA CALIFORNICA NUCLEOPOLYHEDROVIRUS FV11			x	
BACILLUS SUBTILIS (STRAIN QST 713)			x	Laboratory tests suggest potential effects on bumble bees ¹ .
BACILLUS THURINGIENSIS SSP. AIZAWAI		x		
BACILLUS THURINGIENSIS SUBSPECIES KURSTAKI (ALL STRAINS)			x	
BEAUVERIA BASSIANA STRAIN PPRI 5339		x		Potentially pathogenic to honey bees, and laboratory studies suggest effects on bumble bees ¹ .
BIFENAZATE			X	
CANOLA OIL			x	Harmful effects are caused by smothering and suffocation making risks greatest for small arthropods. Larger size of some bees is thought to mitigate negative impacts ² .
CARBARYL	x			
CHLORANTRANILIPROLE			x	
CHLORFENAPYR	x			8 hour ERT for alfalfa leafcutting bees ³ . Residues on plants or soil may harm bees and other beneficial insects used in greenhouse production ⁴ .
CLOTHIANIDIN				
CYANTRANILIPROLE		x		
CYCLANILIPROLE	x			
FENBUTATIN OXIDE			x	
FENPROPATHRIN	x			
FERRIC PHOSPHATE			x	
FLONICAMID			x	
FLUENSULFONE			x	
FLUOPYRAM			x	
FLUPYRADIFURONE		x		
IMIDACLOPRID	x			Bumble bees may be more sensitive to imidacloprid than honey bees ⁵ .
IRON (PRESENT AS FERRIC PHOSPHATE)			x	
KAOLIN			x	

Active Ingredient	Most Restrictive	Moderately Restrictive	Least Restrictive	Additional Information (Where Available)
LAMBDA-CYHALOTHRIN		x		May be more toxic to bees when mixed with propiconazole. > 1 day ERT for alfalfa leafcutting bees ³ .
MALATHION	x			Up to 7 days ERT for alfalfa leafcutting bees ³ .
METAM-POTASSIUM OR POTASSIUM METHYLDITHIO-CARBAMATE			x	
METAM-SODIUM OR SODIUM METHYLDITHIOCARBAMATE			x	
METARHIZIUM ANISOPLIAE (STRAIN F52)			x	
METHOXYFENOZIDE			x	
MINERAL OIL			x	Harmful effects are caused by smothering and suffocation.
NALED	x			Up to 4.5 days ERT for alfalfa leafcutting bees ³ .
ORIENTAL MUSTARD SEED MEAL			x	
PERMETHRIN	x			Up to 3 days ERT for alfalfa leafcutting bees. May be repellent in arid conditions ³ .
PIPERONYL BUTOXIDE			x	
POTASSIUM SALTS OF FATTY ACIDS			x	Non-target insects in flightless stage are vulnerable ⁶ .
PYMETROZINE		x		
PYRETHRINS	x			Commonly mixed with piperonyl butoxide (PBO) which acts as a synergist ³ .
PYRIDABEN	x			> 8 hours ERT for alfalfa leafcutting bees and bumble bees ³ .
PYRIPROXYFEN			x	< 2 hours RT for alfalfa leafcutting bees ³ . May be toxic to bumble bee brood ⁷ .
SILICON DIOXIDE (PRESENT AS 100% DIATOMACEOUS EARTH) - FRESH WATER FOSSILS		x		Has a physical mode of action and can scratch exoskeletons, only for use in greenhouses ⁴ .
SPINOSAD	x			>1 day ERT for alfalfa leafcutting bees ³ .
SPIROMESIFEN		x		May be toxic to bee brood ⁴ .
SPIROTETRAMAT	x			Toxic to bee brood ⁴ .
SULPHUR			x	While most sources say sulphur poses little risk for bees, other sources suggest sulphur may repel bees and disrupt pollination ⁸ .

Active Ingredient	Most Restrictive	Moderately Restrictive	Least Restrictive	Additional Information (Where Available)
Fungicides				
AMETOCTRADIN			x	
AZOXYSTROBIN			x	
BACILLUS AMYLOLIQUE-FACIENS (STRAINS F727, MBI600, D747)			x	
BACILLUS SUBTILIS (STRAIN QST 713)			x	Laboratory tests suggest potential effects on bumble bees ¹ .
BACILLUS SUBTILIS VAR. AMYLOLIQUEFACIENS STRAIN FZB24			x	
BENZOVINDIFLUPYR			x	
BOSCALID			x	Boscalid will also increase the toxicity of insecticide seed treatments to honey bees ⁹ .
CANOLA OIL			x	Harmful effects are caused by smothering and suffocation making risks greatest for small arthropods. Larger size of some bees is thought to mitigate negative impacts ³ .
CAPTAN			x	ERT lasting up to 7 days for mason bees ³ . Negative effects on honey bee brood observed in lab but not in field ¹⁰ .
CHLOROPICRIN			x	
CHLOROTHALONIL			x	Common contaminant of beeswax ¹¹ .
CITRIC ACID LACTIC ACID			x	
COPPER (PRESENT AS COPPER HYDROXIDE)			x	
COPPER (PRESENT AS COPPER OCTANOATE)			x	
COPPER (PRESENT AS COPPER OXYCHLORIDE)			x	
COPPER (PRESENT AS CUPRIC AMMONIUM FORMATE AND TANNATE COMPLEX)			x	
COPPER, PRESENT AS BASIC COPPER SULFATE			x	
CYAZOFAMID			x	
CYPRODINIL			x	
DIFENOCONAZOLE			x	Can synergize with cyprodinil to cause learning difficulties in honey bees ³ .
DIMETHOMORPH			x	
EXTRACT OF REYNOUTRIA SACHALINENSIS			x	

Active Ingredient	Most Restrictive	Moderately Restrictive	Least Restrictive	Additional Information (Where Available)
FENAMIDONE			X	
FENHEXAMID			X	
FLUAZINAM			X	
FLUDIOXONIL			X	
FLUOPICOLIDE			X	
FLUOPYRAM			X	
FLUXAPYROXAD			X	
FOLPET			X	
FUNGUS: GLIOCLADIUM CATENULATUM			X	
GARLIC POWDER			X	
HYDROGEN PEROXIDE		X		
HYDROGEN PEROXIDE AND PEROXYACETIC ACID		X		No information for bees. Very toxic to aquatic life. Low bioaccumulation potential ¹² .
MANCOZEB			X	
MANDIPROPAMID			X	
METALAXYL-M AND S-ISOMER			X	
METAM-POTASSIUM OR POTASSIUM METHYLDITHIOCARBAMATE			X	
METAM-SODIUM OR SODIUM METHYLDITHIOCARBAMATE			X	
METRAFENONE			X	
MINERAL OIL			X	
MONO- AND DI-POTASSIUM SALT OF PHOSPHOROUS ACID			X	
MONO- AND DIBASIC SODIUM, POTASSIUM, AND AMMONIUM PHOSPHITES			X	
MYCLOBUTANIL			X	
ORIENTAL MUSTARD SEED MEAL			X	
OXATHIPIPROLIN			X	
PENTHIOPYRAD			X	
POLYOXIN D ZINC SALT			X	
POTASSIUM BICARBONATE			X	
PROPAMOCARB HYDROCHLORIDE			X	
PROTHIOCONAZOLE			X	
PYDIFLUMETOFEN			X	
PYRACLOSTROBIN			X	
PYRIMETHANIL			X	
STREPTOMYCES GRISEOVIRIDIS STRAIN K61			X	

Active Ingredient	Most Restrictive	Moderately Restrictive	Least Restrictive	Additional Information (Where Available)
SULPHUR			x	While most sources say sulphur poses little risk for bees, other sources suggest sulfur may repel bees and disrupt pollination ⁸ .
TEA TREE OIL			x	
TETRACONAZOLE			x	
TRICHODERMA ASPERELLUM, STRAIN T34			x	
TRICHODERMA HARZIANUM RIFAI STRAIN KRL-AG2			x	
"TRICHODERMA HARZIANUM RIFAI STRAIN KRL-AG2			X	
TRICHODERMA VIRENS STRAIN G-41"			x	
TRICHODERMA HARZIANUM RIFAI STRAIN T-22			x	
TRICHODERMA VIRENS STRAIN G-41 TRICHODERMA HARZIANUM RIFAI STRAIN KRL-AG2				
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 cucurbit 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.

	MOST RESTRICTIVE	MODERATELY RESTRICTIVE	LEAST RESTRICTIVE
	Typically requires the most restrictive precautions, with greater restrictions for applications to highly bee-attractive crops	Typically requires some restrictions on application to bee-attractive crops	Typically requires minimal or no restrictions
Acute adult contact/oral toxicity	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.
Larval toxicity	May have larval toxicity.	May have larval toxicity.	Typically none.
Chronic toxicity	May have chronic toxicity.	May have chronic toxicity.	Typically none.
Residual toxicity	Typically greater than 8 hours.	Typically 2 to 8 hours.	Typically no residual toxicity.



Higher tier studies	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.
Crop pollinator attractiveness	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/minimal restrictions for crops with high, moderate, and low crop attractiveness.
Bloom in relation to harvest	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.
Examples of restrictions	<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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A close-up photograph of a bright yellow flower petal in the foreground, with a green leaf in the background. The petal is slightly out of focus, showing its texture and veins. The leaf is sharp and shows its veins. The background is dark and blurred.

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