

To Whom It May Concern:

Dow AgroSciences has been requested to provide information on the possible effects of several herbicides to honeybees as a result of roadside and Right-of-Way applications made for vegetation management objectives, including Triclopyr (Garlon[®] 3A, Garlon 4 Ultra), Glyphosate (Rodeo[®] and Accord[®] XRT II), Aminopyralid (Milestone[®], Capstone[®]) Aminopyralid/Metsulfuron-methyl (Opensight[®]), Clopyralid (Transline[®]), Fluroxypyr (Vista[®] XRT), Picloram (Tordon[®] K) and Imazapyr (Arsenal, Habitat)¹. We appreciate the opportunity to provide this information to demonstrate the safety of these products based on studies that have been conducted for submission and review by regulatory agencies in many countries. Triclopyr, Aminopyralid, Picloram, Clopyralid, and Fluroxypyr are members of the pyridine herbicide family which all share an auxinic mode of herbicidal action that targets plant growth; unlike an insecticide, this mode of action is plant-specific and has no corresponding insect or animal equivalent. In a similar manner, Glyphosate, Metsulfuron and Imazapyr also have plant-specific herbicidal modes of action; Glyphosate herbicidally inhibits the biosynthesis of aromatic amino acids, Metsulfuron and Imazapyr act to inhibit branched-chain amino acid biosynthesis; again, these are processes that only occur in plants and have no corresponding insect or animal equivalent.

Two main study types are employed in assessing the potential for bee toxicity by regulatory agencies worldwide; these include oral ingestion and dermal contact. The oral ingestion study is intended to assess the potential for bee exposure when foraging on flowering plants and the dermal exposure study assesses direct contact with spray application. Field studies or brood studies are not required unless a compound demonstrates relevant reproductive or behavioral effects in other organisms, or data from residual toxicity studies indicates the potential for extended residual toxicity. None of the herbicides discussed here or any labeled formulation mixing partner, has demonstrated such an effect.

Triclopyr:

Triclopyr butoxyethyl ester is the active ingredient in the end-use formulation Garlon 4, Garlon Ultra, and Forestry Garlon XRT. Triclopyr butoxyethyl ester has been tested under rigorous conditions, both as a technical material and as an end-use formulation, and found to be “practically nontoxic²” to bees on an acute basis. Practically nontoxic is a regulatory term and indicates that the LD₅₀ (the dose required to kill 50% of the test population) is greater than 25 µg per bee, the rate assessed for Triclopyr butoxyethyl ester was 100 µg per bee. While an LD₅₀ value does refer to 50% impact, no significant mortality was observed in any study, so this is simply recorded as a value greater than 100 µg per bee; this rate is substantially greater than any expected environmental concentration of triclopyr butoxyethyl ester that bees would be exposed to in the environment at the maximum labeled rate.

Glyphosate:

Glyphosate is the active ingredient in Rodeo and Accord XRT II and has also been tested under the precise conditions required by the EPA, both as a technical material and as an end-use formulation³. Results from the glyphosate honeybee acute oral toxicity studies demonstrate that both technical and formulated glyphosate are practically nontoxic to the honeybee with LD₅₀ values greater than 100 µg per bee. In a similar manner, the results from the honeybee acute contact toxicity study also resulted in LD₅₀ values greater than 100 µg per bee and confirm that both technical and formulated glyphosate are practically non-toxic to the honeybee through the oral or dermal routes of exposure.

Aminopyralid:

Aminopyralid TIPA salt is the active ingredient in Milestone and Capstone herbicides. Aminopyralid has also been shown to be practically non-toxic to honeybees as well as birds, fish, earthworms, and aquatic invertebrates⁴.

One Aminopyralid formulation, Opensight, also contains 9.45% of metsulfuron-methyl. While Metsulfuron-methyl is in a different family of chemistry, it also has a mode-of-action that is plant specific and has no insect

or animal equivalent. Because of this, bee LD₅₀ values greater than 25 µg per bee were recorded in EPA required studies, it too is characterized as “practically non-toxic” to bees⁵.

Picloram:

Picloram potassium salt is the active ingredient in Tordon K herbicide. This end-use formulation and technical form have been subjected to extensive tests by the U.S. EPA including non-target insects such as honeybees⁶. Results from the picloram honeybee acute oral toxicity studies demonstrate that both the technical and formulated picloram are “practically nontoxic” to the honeybee with LD₅₀ values greater than 100 µg per bee. Additionally, the results from the honeybee acute contact toxicity study also resulted in LD₅₀ values greater than 100 µg per bee and confirm that both technical and the formulated picloram are “practically non-toxic” to the honeybee through the oral or dermal routes of exposure.

Fluroxypyr:

Fluroxypyr meptyl ester is the active ingredient in Vista XRT. According to U.S. EPA approved acute oral and contact toxicity studies, Fluroxypyr has been shown to be “practically non-toxic” to honey bees with LD₅₀ values greater than 25 µg per bee⁷.

Clopyralid:

Clopyralid monoethanolamine salt is the active ingredient in Transline herbicide. As part of the U.S. EPA registration process Clopyralid acute contact and oral toxicity to honeybees has been tested and results indicate clopyralid is practically nontoxic to the honeybee with LD₅₀ values greater than 100 µg per bee⁸.

Imazapyr:

Imazapyr is the active ingredient in Arsenal and Habitat herbicides. While these are not Dow AgroSciences products, these materials have been carefully reviewed by the EPA⁹ and found to be practically non-toxic to honeybees based on the tests previously discussed above. In each submitted study, LC₅₀ values were greater than highest concentration tested. Therefore, there is negligible risk to honeybees.

I trust that this information will be valuable in assessing the potential impact of these useful herbicides on bees. If additional information is necessary, please feel free to contact me at my number or email address below.

Sincerely,



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¹Garlon 3A, Garlon 4 Ultra, Rodeo, Accord XRT II, Vista XRT, Transline, Tordon K, Milestone, Capstone and Opensight are registered trademarks of The Dow Chemical Company (“Dow”) or an affiliated company of Dow. Arsenal and Habitat are registered trademarks of BASF Specialty Products.

²Reregistration Eligibility Decision – Triclopyr, US Environmental Protection Agency; EPA-738-R-98-011, page 39, October, 1998.

³Reregistration Eligibility Decision – Glyphosate, US Environmental Protection Agency; EPA-738-R-93-014, page 51, September, 1993.

⁴Pesticide Fact Sheet – Aminopyralid, United States Office of Prevention, Pesticides Environmental Protection and Toxic Substances Agency (7501C), August 10, 2005, page 7 (www.epa.gov/oppr001/factsheets/aminopyralid.pdf)

⁵Metsulfuron Methyl – Herbicide Profile 3/86, Chemical Fact Sheet for Metsulfuron methyl; Number 71. March 28, 1986. US Environmental Protection Agency

⁶Reregistration Eligibility Decision – Picloram, US Environmental Protection Agency; EPA-738-R-95-019, page 69-70, August 1995.

⁷Pesticide Fact Sheet – Fluroxypyr, United States Office of Prevention, Pesticides Environmental Protection and Toxic Substances Agency (7501C), September 30, 1998, page 9 (www.epa.gov/opp00001/chem_search/.../fs_PC-128959_30-Sep-98.pdf).

⁸Human Health and Ecological Risk Assessment-Final Report-Clopyralid, United States Department of Agriculture, Forest Service;SERA TR 04-43-17-03c, Appendix 3 Page 146, December 4, 2004 .

⁹Registration Eligibility Decision – Imazapyr, US Environmental Protection Agency; EPA 738-R-06-007, page 18, 2006.