UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF CHEMICAL SAFETY
AND POLLUTION PREVENTION

July 10, 2019

PC Code: 005210
DP Barcode: 452640

MEMORANDUM

SUBJECT: **Sulfoxaflor:** Hazard Comparison for Several Alternative Insecticides

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The purpose of this memo is to provide a comparison of the toxicity of sulfoxaflor **(Table 1)** to registered alternative compounds (as recommended by team members from BEAD and RD), for the proposed uses on various agricultural crops. Specifically, EFED compiled additional information regarding the toxicity of sulfoxaflor to birds, mammals, aquatic invertebrates (water column and benthic), fish, and bees – a taxa for which levels of concern (LOC) were exceeded in the sulfoxaflor new chemical ecological risk assessment. These tables provide a comparison of available data on a chemical-by-chemical basis.

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Table 1. Comparison of toxicity endpoints for sulfoxaflor and alternative insecticides.

	Pesticide →	Sulfoxaflor	Imidacloprid	Chlorpyrifos	Acephate*	Dicrotophos	Bifenthrin	L-cyhalothrin
Taxa	Citation (references)	A, B	**C, D, E**	**F, G**	**H**	**I**	**J, K**	**J, L**
	PC Code:	005210	129099	059101	103301	035201	128825	128897
	Class:	Sulfoxamine	Neonicotinoid	Organophosphate	Organophosphate	Organophosphate	Pyrethroid	Pyrethroid
	Max Use Rate (lb/A)	0.266	0.5	3.0	21.8	1.2	2.64	0.156
Honey Bee	Acute Oral LD_{50}, TGAI (ug/bee)	0.146	0.0039	**No Data**	**No Data**	**No Data**	**No Data**	0.91
	Acute Contact LD_{50}, TGAI (ug/bee)	0.130	0.043	0.059	1.2	0.76	0.015	0.038
	Chronic Adult NOAEC (ug/bee/d)	0.0054	0.00016	**No Data**	**No Data**	**No Data**	**No Data**	**No Data**
	Acute Larval LD_{50} (ug/bee)	>0.415	**No Data**					
	Chronic Larval NOAEC (ug/bee/d)	0.212	0.0018					
	RT_{25} (hours)	< 3 (two TEPs)	8	>24			24 - 48	54
Birds	Acute Oral LD_{50} (mg a.i/kg-bw)	>80	17	5.6	6.7 (methamidiphos)	1.22	1800	>390
	Acute Dietary LC_{50} (mg a.i/kg-diet)	>5620	1536	136	42 (methamidiphos)	13	1280	3948
	Repro. NOAEC (mg/kg-diet)	200	125	25	3 (methamidiphos)	0.5	75	5
Mammals	Acute Oral LD_{50} (mg a.i/kg-bw)	750	424	118	15.6 (methamidiphos)	8.0	53.8	56
	Chronic 2-gen repro NOAEC (mg a.i/kg-bw-day)	6.07	16.5	1.0	0.5 (/day) (methamidiphos)	2.0 (mg a.i/kg-diet)	1.5	10
Fish	Freshwater Acute LC_{50} (µg a.i/L)	>363000	229000	1.8	25000 (methamidiphos)	5700	0.15	0.029
	Estuarine/marine Acute LC_{50} (µg a.i/L)	266000	163000	0.4	5630 (methamidiphos)	83800	17.8	0.807
	Freshwater Chronic NOAEC (µg a.i/L)	660	9000	**0.57**	170 (methamidiphos)	9880	0.004	0.031
	Estuarine/marine Chronic NOAEC (µg a.i/L)	1200	6420	0.28	**No Data**	**No Data**	0.1	0.25
Aquatic Invertebrates	Acute Freshwater Daphnid LC_{50} (µg a.i/L)[1]	>400000	0.77	0.06	26 (methamidiphos)	12.6	0.00049	0.00008
	Chronic freshwater Daphnid NOAEC (µg a.i/L)[1]	50500	0.01	0.04	4.5 (methamidiphos)	1.7	0.00005	0.00022
	Acute Estuarine/marine Mysid LC_{50} (µg a.i/L)[2]	640	33	0.035	1050 (methamidiphos)	77	0.0040	0.0049
	Chronic Estuarine/marine Mysid NOAEC (µg a.i/L)[2]	110	0.163	<0.005	174 (methamidiphos)	3.09	<0.0006	0.0002
	Freshwater 10d benthic NOAEC µg ai/kg-OC; (ug/L)	49[3]	(0.74)	105 µg ai/kg sed. (4 ng/L- pw)	**No Data**	**No Data**	12	<0.19
	Freshwater Chronic benthic NOAEC µg ai/kg-OC; (ug/L)	50[3]	(2.1) (0.3; **TEP**)	**No Data**			230	**No Data**
	Estuarine/Marine 10d benthic NOAEC µg ai/kg-OC; (ug/L)	**No Data**	**No Data**				**No Data**	

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Pesticide →		Sulfoxaflor	Imidacloprid	Chlorpyrifos	Acephate*	Dicrotophos	Bifenthrin	L-cyhalothrin
	Marine Chronic benthic NOAEC µg ai/kg-OC; (ug/L)						<132	

Footnotes:

[1]Daphnid or other more sensitive species with associated data evaluation record.

[2]Mysid or other more sensitive species with associated data evaluation record.

[3]Sulfoxaflor is not expected to partition to the sediment due to its low K_{OC}.

TGAI – Technical Grade Active Ingredient; TEP – Typical End-Use Product; Endpoints not designated w/ TEP are reported as TGAI, if TEP is designated it indicates that TEP is more sensitive than TGAI for that species.

* For acephate, due to the chemical degradation process, when the primary degradate, methamidiphos, is more toxic than the parent acephate to a given taxon, that endpoint is used in the risk assessment, and therefore both the parent (acephate) and degradate (methamidiphos) data are presented here for reference for the daphnid acute endpoint.

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References:

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