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

OFFICE OF CHEMICAL SAFETY
AND POLLUTION PREVENTION

July 27, 2020

PC Code: 119032
DP Barcode: X

MEMORANDUM

SUBJECT: **Florylpicoxamid:** Reduced Risk Request for the Proposed Uses on Sugar Beet and Turf

FROM: Holly Rogers, Biologist
Zoe Ruge, Physical Scientist
Environmental Risk Branch V
Environmental Fate and Effects Division (7507P)

THRU: Justin Housenger, Branch Chief
Ryan Mroz, Risk Assessment Process Leader
Environmental Risk Branch V
Environmental Fate and Effects Division (7507P)

TO: William Eckel, Senior Science Advisor
OPP Reduced Risk Committee

Shaja Joyner, Product Manager
Rachel Holloman, Branch Chief
Fungicide-Herbicide Branch
Registration Division (7505P)

Overview

The Environmental Fate and Effects Division (EFED) has reviewed the reduced risk application from the applicant Dow AgroSciences for the proposed uses of the new chemical florylpicoxamid (GF-3840) on sugar beet and turf. The Biological and Economic Analysis Division's (BEAD) review of this request identified five alternative registered active ingredients for use on sugar beet (pyraclostrobin, prothioconazole, difenoconazole, mancozeb, and propiconazole) and six alternatives for the proposed use on turf (iprodione, chlorothalonil, pentachloronitrobenzene (PCNB), triticonazole, pyraclostrobin, and myclobutanil) (USEPA, 2020). The registrant identified seven alternatives for sugar beet and six alternatives for

ED_014083_00000019-00001

turfgrass.[1] The comparative analysis in this memo uses the alternatives identified by BEAD.

The following summary and analysis are based on un-reviewed data submitted for the registration of florylpicoxamid (GF-3840) for various agricultural and non-agricultural uses. The submitted studies have been subjected to a cursory review only. Deficiencies may be found upon a more thorough review of the submitted studies. Florylpicoxamid is generally less persistent than the identified alternatives, but in the middle of the range of mobility, with a low likelihood of leaching to groundwater. As compared to the BEAD identified alternatives, florylpicoxamid is generally more toxic to aquatic invertebrates and fish, and of comparable toxicity (*i.e.*, endpoints are within an order of magnitude of each other) to terrestrial taxa and aquatic plants.

Environmental Fate Comparison of Florylpicoxamid Alternatives

The maximum proposed application rate of florylpicoxamid for the use on sugar beet is 0.134 lb a.i./A applied twice for an annual application rate of 0.268 lb a.i./A/yr. The maximum proposed application rate of florylpicoxamid for the use on turf is 0.134 lb a.i./A applied five times for an annual application rate of 0.669 lb a.i./A/yr. Comparisons of the environmental fate characteristics of florylpicoxamid with the BEAD identified alternatives are provided in **Table 1** for use on sugar beets and **Table 2** for use on turf.

Overall, florylpicoxamid shows low environmental persistence[2], with half-lives < 1 day by all transformation routes except for hydrolysis (16.7 days) and soil photolysis (178 days). One sugar beet alternative, mancozeb, also had low persistence, while prothioconazole had low to moderate persistence. The other three alternatives had moderate to high persistence. For turf use alternatives, iprodione had low to moderate persistence and chlorothalonil had low to slight persistence; all other alternatives were slight-high, moderate-high, or high.

Florylpicoxamid is slightly mobile (K_{OC} 849-4084 L/kg), limiting its runoff potential in the dissolved phase. Combined with its low persistence, leaching to ground water is unlikely. Amongst the alternatives for both sugar beet use and turf use, florylpicoxamid is in the middle of the range for mobility. While not included in this reduced risk assessment, the major degradate of florylpicoxamid, X12485649, was found to be hardly to slightly mobile (K_{OC} 1880-

[1] Dow AgroSciences submitted two requests for reduced risk determination for the use of florylpicoxamid, identifying difenoconazole, propiconazole, prothioconazole, mancozeb, fluxapyroxad, pyraclostrobin, and azoxystrobin for comparison in sugar beet (MRID 51074402) and tebuconazole, chlorothalonil, fluxapyroxad, pyraclostrobin, azoxystrobin, and fluazinam for comparison in turfgrass (MRID 51074403). Referenced in: USEPA (2020) Identification of Fungicides for Control of Disease in Sugarbeet and Turf for Reduced Risk Evaluation of Florylpicoxamid. May 22, 2020. Biological and Economic Analysis Division. Office of Chemical Safety and Pollution Prevention. U.S. Environmental Protection Agency.

[2] Goring et al. (1975) provides the following persistence scale for aerobic soil metabolism half-lives:
- Non-persistent less than 15 days
- Slightly persistent for 15-45 days
- Moderately persistent for 45-180 days, and
- Persistent for greater than 180 days.

71163 L/kg), but highly persistent (aerobic soil metabolism half-life of 142-2010 days; aquatic metabolism half-lives ca. 200 to >10,000 days), suggesting that, on long time scales, it could have the potential to leach into ground water.

Ecological Effects Comparison of Florylpicoxamid Alternatives

The most sensitive endpoints from aquatic and terrestrial toxicity studies were tabulated for the BEAD identified alternatives for use on sugar beets in **Table 3** and for use on turf in **Table 4** for comparison. To illustrate the range of toxicity, this analysis uses a difference of 10x to designate whether the alternative fungicide is considered to have lower toxicity (green), similar toxicity (gray), or higher toxicity (red) than florylpicoxamid. In some cases, due to non-definitive endpoints or lack of data, comparisons to florylpicoxamid toxicity could not be made (white).

Based upon a cursory review of the data, that does not include a full evaluation of the level of utility in risk assessment and identification of potential deficiencies, florylpicoxamid is very highly toxic to freshwater and estuarine/marine invertebrates and fish on an acute basis. Additionally, there is a degradate of florylpicoxamid (X12485649) that is considered more toxic than the parent compound to *Daphnia magna* (acute and chronic) and *Americamysis bahia* (acute only). This degradate (X12485649) is also classified as very highly toxic to freshwater and estuarine/marine animals. Florylpicoxamid shows greater toxicity than most of the BEAD identified alternatives following acute exposure to aquatic invertebrates and fish. Following chronic exposure to aquatic invertebrates and fish, florylpicoxamid shows comparable toxicity (*i.e.*, toxicity endpoints are within one order of magnitude of each other) to or greater toxicity (*i.e.*, the alternative endpoint is more than 10x the florylpicoxamid endpoint) than the BEAD identified alternatives, with the only exception being chlorothalonil for freshwater invertebrates. Florylpicoxamid has toxicity comparable to that of the alternatives with spiked sediment exposure data that have been reviewed by EFED. The toxicity of florylpicoxamid to aquatic plants (vascular and non-vascular) is generally comparable to that of BEAD identified alternatives.

Based on the registrant submitted data that have not yet been verified by EFED, florylpicoxamid is practically non-toxic to birds and mammals on an acute oral basis. On an acute dietary basis, florylpicoxamid is categorized as slightly toxic to birds; however, no significant toxicity was observed at the highest tested concentration (*i.e.*, this endpoint is non-definitive). Generally, on an acute basis, the toxicity values for florylpicoxamid and the BEAD identified alternatives to birds and mammals do not exhibit sensitive endpoints with most of the acute endpoints being at or greater than the highest dose tested (*i.e.*, non-definitive endpoints). Following chronic exposure to birds and mammals, florylpicoxamid shows toxicity comparable (*i.e.*, toxicity endpoints are within one order of magnitude of each other) to that of all the BEAD identified alternatives, except difenoconazole, which is more toxic to birds and mammals than florylpicoxamid on a chronic basis. Florylpicoxamid is practically non-toxic to honey bees on an acute basis. Adult honey bees do not show a marked sensitivity to florylpicoxamid or to most of the alternative fungicides after acute contact or oral exposures, as evidenced by endpoints greater than the highest dose tested (*i.e.*, non-definitive endpoints). For adult honey bees on a

chronic basis and larval honey bees on an acute and chronic basis, the florylpicoxamid endpoints are larger (*i.e.*, of lower toxicity) than one third of the alternatives' endpoints and are comparable (*i.e.*, within one order of magnitude) to the remaining endpoints. Seedling emergence of terrestrial plants does not show high sensitivity to florylpicoxamid or to the alternative fungicides at the tested application rates, as evidenced by endpoints greater than the highest rate tested (*i.e.*, non-definitive endpoints). In the vegetative vigor toxicity tests, the toxicity endpoint for florylpicoxamid is of comparable toxicity (*i.e.*, within one order of magnitude) to or greater toxicity (*i.e.*, the alternative endpoint is more than 10x the florylpicoxamid endpoint) than the endpoints for the alternatives where comparisons were possible.

Table 1. Comparison of the Fate and Chemical Properties of Florylpicoxamid to BEAD identified alternatives for Use on Sugar Beets

	Florylpicoxamid[1]	Pyraclostrobin[2]	Prothioconazole[3]	Difenoconazole[4]	Mancozeb[5]	Propiconazole[6]
Maximum Single App Rate (lb a.i./A)	0.134	0.196	0.178	0.11	1.6	0.11?
Water Solubility (mg/L)	4.0 @ 20°C	2.7 @ pH 7, 20°C	300 @pH 8, 20°C	15 @pH7, 25°C	0.67-13	100 @25°C
Vapor Pressure (torr)	$6.8x10^{-8}$ @25°C Nonvolatile	$6.88x10^{-7}$ @20°C Nonvolatile	$3x10^{-9}$ @20°C Nonvolatile	$2.5x10^{-10}$ @25°C Nonvolatile	<$2.1x10^{-8}$ @ 20°C Nonvolatile	$1.0x10^{-6}$
Henry's Law Constant	$5.92x10^{-9}$ atm-m^3/mol	$5.31x10^{-6}$ @20°C	$2.96x10^{-10}$ @20°C	$3.64x10^{-10}$	<$2.31x10^{-9}$ atm-m^3/mol	$9.1x10^{-5}$
K_{OC} (L/kg)	849-4084 Slightly Mobile	6000-16000 Slightly to Hardly Mobile	* Estimated Low Mobility	3870-11202 Slightly mobile	860-5288 Slightly Mobile	382-1134 Moderately Mobile
Aerobic Soil Metabolism Half-Life (d)	0.206-0.57	34.6-323	0.21-23.5	84.5-1600	Observed in Hours	43-70
Aerobic Aquatic Metabolism Half-Life (d) in the total system	0.0826-0.1	7.38-25.1	3.89-51	301-860	0.67	>30
Anaerobic Aquatic Metabolism Half-Life (d)	0.366-0.426	3.28-8.52	17.7-110	433-1245	ND*	363
Log K_{OW}	4.2 @ pH 7	4.18 @ pH 6.5	2.0 @ pH 7	4.4	1.3	3.72
Hydrolysis Half-Life (d) @pH 7	16.7	Stable	Stable	Stable	0.8-1.4	Stable
Aqueous Photolysis Half-Life (d) @ 40°N	0.21	0.062	9.7	228	Stable	Stable
Soil Photolysis Half-Life (d)	178	Stable	Stable	349-823	Stable	NA
Environmental Persistence	Low	Slight to High	Low to Moderate	Moderate to Very High	Low	Moderate to High

NA = not available

[1] Registrant submission

[2] 099100_DP448673_PRA_6.25.19

[3] 113961_DP453916_PRA_6-30-2020

*Parent compound mobility could not be determined due to instability and low column resolution. Very high sorption was estimated for parent (*i.e.*, lower mobility than transformation products). Two degradates had mean K_{OC} values of 575 and 2556 L/kg-soil.

[4] 128847_DP452414_S3NU_10-23-19

[5] 014504_425211_PF 06-11-15
*Study suggests possible longer half-lives than the aerobic conditions
[6] 122101_D429077_PF_12-9-2015

Table 2. Comparison of the Fate and Chemical Properties of Florylpicoxamid to BEAD identified alternatives for Use on Turfgrass

	Florylpicoxamid[1]	Pyraclostrobin[2]	Iprodione[3]	Chlorothalonil[4]	PCNB[5]	Triticonazole[6]	Myclobutanil[7]
Maximum Single App Rate (lb a.i./A)	0.134	0.196	5.51	11.3*	32.67	1.15	1.3
Water Solubility (mg/L)	4.0 @ 20°C	2.7 @ pH 7, 20°C	13 @ 20°C	0.8-0.96	0.44	9.9 @ 20°C	142 @ pH 7, 20°C
Vapor Pressure (torr)	$6.8x10^{-8}$ @25°C Nonvolatile	$6.88x10^{-7}$ @20°C Nonvolatile	$2.7x10^{-7}$ @25°C Nonvolatile	$5.72x10^{-7}$ @25°C Nonvolatile	$1.13x10^{-4}$ @ 25°C Volatile	$1x10^{-8}$ @ 20°C Nonvolatile	$<9.75x10^{-6}$ @ 25°C
Henry's Law Constant	$5.92x10^{-9}$ atm-m^3/mol	$5.31x10^{-6}$ @20°C	$9.0x10^{-9}$ atm-m^3/mol @20°C	$2.6x10^{-7}$ atm-m^3/mol	$9.98x10^{-5}$ atm-m^3/mol @ 25°C	$4.22x10^{-10}$ atm-m^3/mol @ 20°C	$2.6x10^{-8}$ atm-m^3/mol @ 25°C
K_{OC} (L/kg)	849-4084 Slightly Mobile	6000-16000 Slightly to Hardly Mobile	223-543 K_{FOC} Moderately Mobile	1121-11935 K_{FOC} Slightly Mobile	1588-17508 Hardly to Slightly Mobile	344-812 Moderately Mobile	225.7-920** Moderately Mobile
Aerobic Soil Metabolism Half-Life (d)	0.206-0.57	34.6-323	7.96-103	0.3-21.3	77-189	81-715	198-224
Aerobic Aquatic Metabolism Half-Life (d) in the total system	0.0826-0.1	7.38-25.1	2.51-9	0.06-3.4	ND	210	417-842
Anaerobic Aquatic Metabolism Half-Life (d)	0.366-0.426	3.28-8.52	5.38-7.27	9.7	ND	Stable	NA
Log K_{OW}	4.2 @ pH 7	4.18 @ pH 6.5	3.1	3.8	4.64 @ 25°C	3.29 @ pH 7	2.98
Hydrolysis Half-Life (d) @pH 7	16.7	Stable	4.2	Stable	Stable	Stable	Stable
Aqueous Photolysis Half-Life (d)	0.21	0.062	64 @ 25°C, 28°N	10.3 hours @pH7, 30°N	1.12-2.5	7.5 hours to 48 days	222
Soil Photolysis Half-Life (d)	178	Stable	Stable	Stable	Stable	92.4	143
Environmental Persistence	Low	Slight to High	Low to Moderate	Low to Slight	Moderate to High	Moderate to High	High

NA = not available
[1] Registrant submission

[2] 099100_DP448673_PRA_6.25.19
[3] 109801_453795_PRA_6-30-2020
[4] 081910_D394667+_PF_3-22-2012
* 081901_D441326_S3NU_04-03-18
[5] Pentachloronitrobenzene 056502_D429797_PF_03-06-16
[6] 125620_440853_PRA Triticonazole_12-19-19
[7] 128857_454420_PRA_10-3-19
** MRID 00141682

Table 3. Comparison of the Most Sensitive Ecotoxicity[1] Endpoints of Florylpicoxamid to Alternative Fungicides BEAD Identified for Use on Sugar Beets

Taxon	Toxicity Endpoint	Florylpicoxamid[2]	Pyraclostrobin	Prothioconazole	Difenoconazole	Mancozeb	Propiconazole
Freshwater fish	LC_{50} (µg a.i./L)	11	6.2	1830	810	910	850
	NOAEC (µg a.i./L)	3.42	2.4	No data[7]	8.7	2.19	95
Freshwater invertebrates (water-column)	EC_{50} (µg a.i./L)	59[3]	15.7	1200	770	1040	1300
	NOAEC (µg a.i./L)	7.23[3]	4	510	5.6	18	180
Freshwater invertebrates (sediment)	NOAEC: Sediment (mg a.i./kg-dw)	6.89	2.82	No data	1.8	8.17[8]	No data
E/M fish	LC_{50} (µg a.i./L)	7.61	76.9	>10300	819	1600	2244
	NOAEC (µg a.i./L)	0. 802	10.8	No data[6]	0.86	No data[7]	No data[6]
E/M invertebrates (water-column)	LC_{50} (µg a.i./L)	9.95[3]	4.6	2400	150	1600[9]	510
	NOAEC (µg a.i./L)	0.801	<0.2[4]	No data[6]	4.8	No data[7]	205
E/M invertebrates (sediment)	NOAEC: Sediment (mg a.i./kg-dw)	21	2.74	No data	10.2	No data	No data
Nonvascular aquatic plants	EC_{50} (µg a.i./L)	103	1.5	21	98	47	21
Vascular aquatic plants	EC_{50} (µg a.i./L)	968	1720	73	1900	>87.8[4]	3500
Birds	LD_{50} (mg a.i./kg-bw)	>2000	>1446[4]	>2000[4]	>2000[4]	No suitable data	2825[4]
	LC_{50} (mg a.i./kg-diet)	>4000	>5000[4]	>4983[4]	4760[4]	No suitable data	>5620[4]
	NOAEC (mg a.i./kg-diet)	1000	1061.5	982	21.9	125	1000
Mammals	LD_{50} (mg a.i./kg-bw)	>2000	>2000[4]	≥6200[4]	1453[4]	>5000[4]	1344[4]
	NOAEL (mg a.i./kg-bw/day)	58.3	29	100	1.25	120	42
Bees	Adult Contact LD_{50} (µg a.i./bee)	>100	>100[4,5]	>200[4]	>100[4]	179[4]	>25[4]
	Adult Oral LD_{50} (µg a.i./bee)	>109.2	>110[4,5]	>71[4]	>71.3[4]	>110[4,10]	No data
	Adult NOAEL (µg a.i./bee/day)	13.4	1[5]	No data	13	No suitable data	No data
	Larval LD_{50} (µg a.i./larva)	32.7	4.8[5]	>58[4]	No data	No data	54

Taxon		Toxicity Endpoint	Florylpicoxamid[2]	Pyraclostrobin	Prothioconazole	Difenoconazole	Mancozeb	Propiconazole
		Larval NOAEL (µg a.i./larva/day)	21.1	2.9[5]	2.0	9.28	3.0[11]	2.6
Terrestrial Plants	**SE**	IC_{25} (lb a.i./A)	>0.268	>0.118[4]	>0.272[4]	>0.1114	>4.5[4]	0.094[4]
	VV	IC_{25} (lb a.i./A)	0.120	>0.118[4]	>0.272[4]	>0.123[4]	>14	0.039

Shading Key	
	Fungicide is less toxic than florylpicoxamid
	Fungicide is considered equivalently toxic as florylpicoxamid
	Fungicide is considered more toxic than florylpicoxamid

Symbols and abbreviations:

a.i.: active ingredient
bw: body weight
dw: dry weight
E/M: Estuarine marine
SE: Seedling emergence (terrestrial plant toxicity study)
VV: Vegetative vigor (terrestrial plant toxicity study)

[1] No Observed Adverse Effect (NOAEC/NOAEL) values reported may be the highest concentration tested with no significant effects noted. These numbers are compared as they are the values used in risk assessment.
[2] The presented florylpicoxamid endpoints were submitted by the registrant; however, these data are subject to EFED review and verification.
[3] A degradate of florylpicoxamid (X12485649) is considered more toxic than the parent compound to *Daphnia magna* and *Americamysis bahia* (acute only).
[4] Comparison of toxicity endpoints between florylpicoxamid and this alternative cannot be made because of uncertainty regarding the non-definitive endpoint.
[5] Pyraclostrobin has shown increased toxicity to bees when formulated with certain other fungicides.
[6] In risk assessment acute-to-chronic ratios may be used to estimate toxicity based on existing data. These estimates are not compared here.
[7] A study has been submitted for this guideline requirement, but the study has not been reviewed yet by EPA.
[8] Sediment concentration in this study was mg total radioactive residues/kg dry weight sediment.
[9] This is for TGAI tested on Eastern oysters. A formulation was tested on mysids, resulting an LC50 of 9.49 µg a.i./L (supplemental study).
[10] This endpoint was from a toxicity test using a formulation (Mancozeb 800 WP, 85.32% purity), not technical grade active ingredient.
[11] This endpoint was from a toxicity test using a formulation (Mancozeb 80 WP, 81.58% purity), not technical grade active ingredient.

Table 4. Comparison of the Most Sensitive Ecotoxicity[1] Endpoints of Florylpicoxamid to Alternative Fungicides BEAD Identified for Use on Turfgrass

Taxon	Toxicity Endpoint	Florylpicoxamid[2]	Iprodione	Chlorothalonil	PCNB	Triticonazole	Pyraclostrobin	Myclobutanil
Freshwater fish	LC_{50} (µg a.i./L)	11	6160	18	100	>2300	6.2	2400
	NOAEC (µg a.i./L)	3.42	260	1.3	13	12	2.4	980
Freshwater invertebrates (water-column)	EC_{50} (µg a.i./L)	59[3]	240	54	770	7600	15.7	11,000
	NOAEC (µg a.i./L)	7.23[3]	288	0.6	18	110	4	No data[7]
Freshwater invertebrates (sediment)	NOAEC: Sediment (mg a.i./kg-dw)	6.89	No data	No data[6]	No data	No data	2.82	No data
E/M fish	LC_{50} (µg a.i./L)	7.61	>8140	No suitable data	7900	>5700	76.9	4700
	NOAEC (µg a.i./L)	0. 802	57.4	10.9	No data[7]	122	10.8	No data[7]
E/M invertebrates (water-column)	LC_{50} (µg a.i./L)	9.95[3]	2240	3.6	12	3500	4.6	240
	NOAEC (µg a.i./L)	0.801	7.5	No suitable data[7]	No data[7]	25	<0.2[4]	85.6
E/M invertebrates (sediment)	NOAEC: Sediment (mg a.i./kg-dw)	21	No data	No data[6]	No data	No data	2.74	No data
Nonvascular aquatic plants	EC_{50} (µg a.i./L)	103	330	12	No data	350	1.5	122
Vascular aquatic plants	EC_{50} (µg a.i./L)	968	>12,640	640	No data	1400	1720	3150
Birds	LD_{50} (mg a.i./kg-bw)	>2000	930[4]	>4640[4,8]	>2250[4]	>1900[4]	>1446[4]	498[4]
	LC_{50} (mg a.i./kg-diet)	>4000	1800[4]	>10,000[4,8]	>54,000[4]	>5000[4]	>5000[4]	779[4]
	NOAEC (mg a.i./kg-diet)	1000	300	153[8]	600	157	1061.5	256
Mammals	LD_{50} (mg a.i./kg-bw)	>2000	1160[4]	>10,000[4,8]	>5050[4]	>2000[4]	>2000[4]	1360[4]
	NOAEL (mg a.i./kg-bw/day)	58.3	15[5]	92.5[8]	200	37.5	29	16
Bees	Adult Contact LD_{50} (µg a.i./bee)	>100	>100[4]	>181[4]	>100[4]	>24[4]	>100[4,9]	>100[4]
	Adult Oral LD_{50} (µg a.i./bee)	>109.2	>100[4]	No data	No data	>156[4]	>110[4,9]	>500[4]
	Adult NOAEL (µg a.i./bee/day)	13.4	No data	No data	No data	16.6	1[9]	0.8119
	Larval LD_{50} (µg a.i./larva)	32.7	No data	No data	No data	7.3	4.8[9]	No data

Taxon		Toxicity Endpoint	Florylpicoxamid[2]	Iprodione	Chlorothalonil	PCNB	Triticonazole	Pyraclostrobin	Myclobutanil
		Larval NOAEL (µg a.i./larva/day)	21.1	7.5	No data	No data	2.1	2.9[9]	6.08
Terrestrial Plants	SE	IC_{25} (lb a.i./A)	>0.268	≥7.62[4]	4.4[4]	No data	0.015	>0.118[4]	No data
	VV	IC_{25} (lb a.i./A)	0.120	≥7.62	>11.3	No data	1.3	>0.118[4]	0.416

Shading Key	
	Fungicide is less toxic than florylpicoxamid
	Fungicide is considered equivalently toxic as florylpicoxamid
	Fungicide is considered more toxic than florylpicoxamid

Symbols and abbreviations:

a.i.: active ingredient
bw: body weight
dw: dry weight
E/M: Estuarine marine
SE: Seedling emergence (terrestrial plant toxicity study)
VV: Vegetative vigor (terrestrial plant toxicity study)

[1] No Observed Adverse Effect (NOAEC/NOAEL) values reported may be the highest concentration tested with no significant effects noted. These numbers are compared as they are the values used in risk assessment.
[2] The presented florylpicoxamid endpoints were submitted by the registrant; however, these data are subject to EFED review and verification.
[3] A degradate of florylpicoxamid (X12485649) is considered more toxic than the parent compound to *Daphnia magna* and *Americamysis bahia* (acute only).
[4] Comparison of toxicity endpoints between florylpicoxamid and this alternative cannot be made because of uncertainty regarding the non-definitive endpoint.
[5] This endpoint was reported as a NOAEC of 300 mg/kg-diet in the study report, which was then converted to a NOAEL using the standard FDA lab rat conversion.
[6] A study has been submitted for this guideline requirement, but the study has not been reviewed yet by EPA.
[7] In risk assessment acute-to-chronic ratios may be used to estimate toxicity based on existing data. These estimates are not compared here.
[8] Chlorothalonil has a degradate that is considered more toxic than the parent to birds and mammals.
[9] Pyraclostrobin has shown increased toxicity to bees when formulated with certain other fungicides.

References

Florylpicoxamid

Garcia, S. N. et al. (2020) XDE-659: A 10-Day Toxicity Test with the Marine Amphipod (*Leptocheirus plumulosus*) Using Spiked Whole Sediment. Performing Laboratory Study No. 379A-308, Sponsor Study ID 190079. Unpublished study prepared by Eurofins EAG Agroscience, 185p. MRID 51074446.

Hughes, J. et al. (2020) Request for Reduced Risk Determination for the Use of Florylpicoxamid on Sugar Beet. Dow AgroSciences LLC Report ID 200685, 146p. MRID 51074402.

Hughes, J. et al. (2020) Request for Reduced Risk Determination for the Use of Florylpicoxamid on Turf. Dow AgroSciences LLC Report ID 200687, 129p. MRID 51074403.

Leak, T. 2018. XDE-659: Whole Sediment Acute Toxicity Test with Midge Larvae (*Chironomus dilutus*). ABC Study No. 85219, DAS Study No. 170311. Unpublished study prepared by Analytical Bio-Chemistry Laboratories. 185p. MRID 51074444.

USEPA (2020) Identification of Fungicides for Control of Disease in Sugarbeet and Turf for Reduced Risk Evaluation of Florylpicoxamid. May 22, 2020. Biological and Economic Analysis Division. Office of Chemical Safety and Pollution Prevention. U.S. Environmental Protection Agency.

Vergé, E. (2018) XDE-659 - Honey Bee (*Apis mellifera* L.) 22 Day Larval Toxicity Test (Repeated Exposure). EAS Study Code S17-00212, DAS Study ID 170085. Unpublished study prepared by Eurofins Agroscience, 112p. MRID 51074545.

Vergé, E. (2018) XDE-659 - Honey Bee (*Apis mellifera* L.) Larval Toxicity Test (Single Exposure). EAS Study Code S18-01955, DAS Study ID 180573. Unpublished study prepared by Eurofins Agroscience, 91p. MRID 51074544.

Vergé, E. (2019) XDE-659 - Assessment of Effects on the Adult Honey Bee, *Apis mellifera* L, in a 10 Day Chronic Feeding Test under Laboratory Conditions. EAS Study Code S17-00197, DAS Study ID 170084. Unpublished study prepared by Eurofins Agroscience, 160p. MRID 51074546.

Pyraclostrobin

USEPA (2019) Pyraclostrobin: Addendum to Draft Ecological Risk Assessment for Registration Review Based on Re-analysis of Larval Chronic Toxicity Study. August 19, 2019. PC Code 099100, DP Barcode 453624.

USEPA (2019) Pyraclostrobin: Draft Ecological Risk Assessment for Registration Review. June 25,

2019. PC Code 099100, DP Barcode 448673.

Prothioconazole

USEPA (2015) Registration Review: Preliminary Problem Formulation for Environmental Fate, Ecological Risk, Endangered Species, and Human Health Drinking Water Exposure Assessments for Prothioconazole. December 7, 2015. PC Code 113961, DP Barcode 427289.

USEPA (2020) Data Evaluation Record: Prothioconazole Chronic (Repeated Dose) Toxicity Test with Larval Honey Bee Non-Guideline. March 30, 2020. PC Code 113961, DP Barcode 448132, MRID 50633903.

USEPA (2020) Data Evaluation Record: Prothioconazole Acute (Single Dose) Toxicity Test with Honey Bee Larvae Non-Guideline. April 30, 2020. PC Code 113961, DP Barcode 457459, MRID 50633902.

USEPA (2020) Prothioconazole: Draft Ecological Risk Assessment for Registration Review. June 30, 2020. PC Code 113961, DP Barcode 453916.

Difenoconazole

USEPA (2015) Difenoconazole: Preliminary Problem Formulation for Environmental Fate, Ecological Risk, Endangered Species, and Drinking Water Exposure Assessments in Support of Registration Review. November 5, 2015. PC Code 128847, DP Barcode 428500.

USEPA (2018) Data Evaluation Record: Chronic Sediment *Hyalella azteca* Toxicity Test (Following EPA Test Method 100.4). August 24, 2018. PC Code 128847, DP Barcode 441279, MRID 50213701.

USEPA (2018) Data Evaluation Record: Whole Sediment Chronic Toxicity Test, Marine Invertebrates Non-Guideline. August 24, 2018. PC Code 128847, DP Barcode 441279, MRID 50213702.

USEPA (2019) Difenoconazole: Ecological Risk Assessment for a Proposed Label Amendment to Increase the Use Rate on Golf Course Turfgrass. October 23, 2019. PC Code 128847, DP Barcode 452414.

USEPA (2020) Data Evaluation Record: Chronic (Repeat Dose) Toxicity Test with the Honey Bee (*Apis mellifera*) Larvae Non-Guideline. May 11, 2020. PC Code 128847, DP Barcode 444982, MRID 50449801 & 50449802.

USEPA (2020) Data Evaluation Record: Chronic Toxicity Test with Honey Bee Non-Guideline Chronic Feeding Study. May 11, 2020. PC Code 128847, DP Barcode 451255, MRID 50727701.

USEPA (2020) Data Evaluation Record: Honey Bee – Acute Contact and Oral LC50 Test OCSPP 850.3020 & Non-Guideline. May 11, 2020. PC Code 128847, DP Barcode 444146, MRID 50367601.

Mancozeb

USEPA (2015) Registration Review: Problem Formulation for Mancozeb. June 9, 2015. PC Code 014504, DP Barcode 425211.

USEPA (2020) Data Evaluation Record: Chronic (Repeat Dose) Toxicity Tests with the Honey Bee (*Apis mellifera*) Larvae Non-Guideline. March 24, 2020. PC Code 014504, DP Barcode 442191, MRID 50271701.

USEPA (2020) Data Evaluation Record: Honey Bee – Acute Contact & Oral LC_{50} Test OCSPP 850.3020 & Non-Guideline. April 30, 2020. PC Code 014504, DP Barcode 442191, MRID 50271702.

USEPA (2020) Data Evaluation Record on the Toxicity of Manzate ProStick (a.i. Mancozeb) to Terrestrial Vascular Plants: Seedling Emergence. April 13, 2020. PC Code 014504, DP Barcode 452105, MRID 50536706.

USEPA (2020) Data Evaluation Record on the Toxicity of Manzate ProStick (a.i. Mancozeb) to Terrestrial Vascular Plants: Vegetative Vigor. April 13, 2020. PC Code 014504, DP Barcode 452106, MRID 50536707.

USEPA (2020) Data Evaluation Record: Toxicity of Mancozeb TGAI to Aquatic Vascular Plants (*Lemna gibba*). April 16, 2020. PC Code 014504, DP Barcode 452102, MRID 50536701.

Propiconazole

USEPA (2015) Registration Review: Problem Formulation for Propiconazole. December 9, 2015. PC Code 122101, DP Barcode 429077.

USEPA (2020) Data Evaluation Record: Acute (Repeated Dose) Toxicity Test with the Honey Bee Larval (An EPA Non-Guideline Study). March 31, 2020. PC Code 122101, DP Barcode 442865, MRID 50265601.

USEPA (2020) Data Evaluation Record: Chronic (Repeated Dose) Toxicity Test with the Honey Bee (An EPA Non-Guideline Study). March 31, 2020. PC Code 122101, DP Barcode 446693, MRID 50552201.

Iprodione

USEPA (2020) Iprodione: Draft Ecological Risk Assessment for Registration Review. June 30, 2020. PC Code 109801, DP Barcode 453795.

Chlorothalonil

USEPA (2012) Registration Review—Preliminary Problem Formulation for the Ecological Risk Assessment and Drinking Water Exposure Assessment of Chlorothalonil. March 22, 2012. PC Code 081901, DP Barcodes 394667 & 394849.

USEPA (2017) Data Evaluation Record on the Acute Toxicity of Chlorothalonil to Terrestrial Vascular Plants: Seedling Emergence. September 13, 2017. PC Code 081901, DP Barcode 419818, MRID 49342711.

USEPA (2017) Data Evaluation Record on the Acute Toxicity of Chlorothalonil to Terrestrial Vascular Plants: Vegetative Vigor. September 12, 2017. PC Code 081901, DP Barcode 419821, MRID 49342712.

USEPA (2018) New Use Assessment for Granular Chlorothalonil Formulation: Anderson's 3-Way fungicide- containing the active ingredients propiconazole (0.62%), chlorothalonil (3.88%), and fludioxonil (0.16%). April 3, 2018. PC Code 081901, DP Barcode 441326.

USEPA (2019) Data Evaluation Record: Toxicity of Chlorothalonil to Sheepshead Minnow (*Cyprinodon variegatus*), Early Life Cycle. June 5, 2019. PC Code 081901, DP Barcode 419811, MRID 49342708.

Pentachloronitrobenzene (PCNB)

USEPA (2016) Registration Review: Preliminary Problem Formulation for Environmental Fate, Ecological Risk, Endangered Species, and Human Health Drinking Water Exposure Assessments for Pentachloronitrobenzene (PCNB). March 6, 2016. PC Code 056502, DP Barcode D429797.

Triticonazole

USEPA (2019) Triticonazole: Draft Ecological Risk Assessment for Registration Review. December 19, 2019. PC Code 125620, DP Barcode 440853.

Myclobutanil

Allen, S.S. (1984) The Adsorptive and Desorptive Properties of RH-3866 on Soils. Technical Report No. 310-84-05. May 17, 1984. MRID 00141682.

USEPA (2019) Myclobutanil: Draft Ecological Risk Assessment for Registration Review. October 3, 2019. PC Code 128857, DP Barcode 454420.