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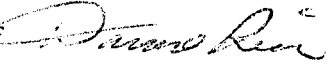
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CHEMICAL: Topramezone (BAS 670H)
PC Code 123009 / Sponsor: BASF Corporation

SUBJECT: **Data Review for TOPRAMEZONE (BAS 670 336SC Post Emergent Corn Herbicide) on Terrestrial Animals, Aquatic Organisms, and Plants.**

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As indicated in our "New Chemical Review for the uses of topramezone on corn" -a NAFTA Joint Review with Canada, our analysis was based on screening level review of the ecological effects studies. We have now completed the peer review of these studies. Copies of each study's data evaluation records (DERs) are attached.

The Environmental Fate and Effects Division (EFED) has completed its review of ecological effects data submitted by BASF Corporation on topramezone. In addition, degradate (M670H05) and end use product (BAS 670 00H) studies were also submitted. The topramezone studies included acute avian oral (MRID 45902309), subacute avian dietary (MRIDs 45902310 and



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45902311) and chronic avian reproduction (MRIDs 45902312 and 45902313); acute honeybee contact (MRID 45902325) and non-guideline acute honeybee contact and oral with end use product (MRID 45901814); non-guideline earthworm (MRID 45902326); non-guideline nontarget insects with end use product (MRIDs 45901815, -16, -17, -18, and -19); acute freshwater fish (MRIDs 45902314 and 45902315) and invertebrate (MRID 45902316); acute freshwater fish with end use product (MRID 45901813) and invertebrate (MRID 45901820); chronic freshwater fish early life-stage (MRID 45902321) and invertebrate life-cycle (MRID 45902320); acute estuarine/marine fish (MRID 45902319) and invertebrate (MRIDs 45902317 and 45902318); tier II terrestrial plant seedling emergence (MRID 459023-27), tier II terrestrial plant vegetative vigor (MRID 459023-28), and tier III terrestrial plant vegetative vigor (MRID 46460702); tier II aquatic vascular plant (MRID 45902329), tier II aquatic non-vascular plants (MRIDs 45902330, -31, -32, -33), and tier II aquatic vascular plant with end use product (MRID 45901821). The degradate of M670H05 studies of acute freshwater fish (MRID 46242706) and invertebrates (MRID 45901820), and tier II aquatic vascular plants (MRID 46242704) study with the duckweed, *Lemna gibba*, are included as well. Guideline studies on animals and aquatic plants were conducted using technical grade active ingredient while studies of terrestrial plants were conducted using formulated end product.

Tables 1 through 24 (excluding Tables 4 and 5 for mammals) provide a brief summary of each study's toxicity endpoint(s) and classification. If you have any questions or comments regarding these studies, please do not hesitate to contact us.

Toxicity to terrestrial animals and insects, aquatic organisms, and plants

Table 1. Acute Toxicity of Topramezone to Northern bobwhite and Mallard ducks.

Avian Acute Oral Toxicity					
Species	% ai	Toxicity value	Toxicity category	MRID # (author)	Study classification ¹
Northern bobwhite quail (<i>Colinus virginianus</i>)	97.7	LD ₅₀ >2000 ² mg ai/kg bw	practically nontoxic	45902309 (Zok, S. 2000)	acceptable

¹ acceptable (study satisfies guideline). supplemental (study is scientifically sound, but does not satisfy guideline). Invalid (study is not scientifically sound and does not satisfy guideline).

² no mortality reported.

Table 2. Subacute Dietary Toxicity of Topramezone to Northern bobwhite and Mallard ducks.

Avian Subacute Dietary Toxicity					
Species	% ai	Toxicity value	Toxicity category	MRID # (author)	Study Classification
Northern bobwhite quail (<i>Colinus virginianus</i>)	95.8	LC ₅₀ >5000 mg a.i./kg dw	practically nontoxic	45902310 (Zok, S. 2001)	supplemental ¹
Mallard duck (<i>Anas platyrhynchos</i>)		LC ₅₀ >5000 mg a.i./kg dw	practically nontoxic	45902311 (Zok, S. 2000)	acceptable

¹ data verifying the stability of the test substance in treated feed were not provided.

Table 3. Chronic Toxicity of Topramezone to Northern bobwhite and Mallard ducks.

Avian Reproduction						
Species	% ai	NOAEC (ppm)	LOAEC (ppm)	Affected endpoints	MRID no. (author)	Study classification
Northern bobwhite	95.8	294	1012	hatchling ³	45902312 (Zok, D. 2002)	supplemental ¹
Mallard		<100	100	body weight ⁴	45902313 (Zok, D. 2002)	supplemental ²

¹ stability of topramezone in the treated feed was not assessed at concentration levels.

² the stability of topramezone in the treated feed was not assessed at concentration levels and a NOAEC could not be determined

³ the ratio of number hatched to live embryos

⁴ Hatchling body weight and adult female weight gain

Table 4. Acute Toxicity of Topramezone to Mammals.

Mammalian Acute Oral Toxicity				
Species	% ai	Test type	Toxicity value	MRID#
Laboratory rat	97.7	acute oral	>2000 mg/kg bw	45902118
Laboratory rat	95.8	acute oral	>2000 mg/kg bw	45902119
Laboratory rat	99	acute oral	>2000 mg/kg bw	45902120

Table 5. Chronic Toxicity of Topramezone to Mammals.

Mammalian Reproduction				
Species	% ai	Test type	Toxicity value	MRID#
Laboratory rat	95.8	2-generation	NOAEC 4000 ppm; LOAEC >4000 ppm	45902214

Table 6. Acute Contact Toxicity of Topramezone to Honeybees.

Nontarget Insect Acute Contact Toxicity					
Species	% ai	LD ₅₀	Toxicity category	MRID no. (author)	Study classification
Honey bee	95.8	>100 µg ai/bee	practically nontoxic	45902325 (Palmer, S.J., Krueger, H.O. and Holmes, C.M. 2001)	acceptable

Table 7. Acute Contact and Oral Toxicity of BAS 670 00H to Honeybees.

Nontarget Insect Acute Contact and Oral Toxicity					
Species	% ai	LD ₅₀ s	Toxicity category	MRID no. (author)	Study classification
Honey bee	31	>100 ug EP/bee	practically nontoxic	45901814 (Schmitzer, S. 2000)	supplemental ¹

¹ not an EPA guideline

Table 8. Toxicity of Topramezone to Earthworms.

Nontarget Insect Toxicity					
Species	% ai	LD ₅₀	Toxicity category	MRID no.	Study classification
earthworm (<i>Eisenia fetida</i>)	95.8	>1000 mg ai/kg dw soil	practically nontoxic	45902326	supplimental ¹

¹ not an EPA guideline**Table 9. Toxicity of BAS 670 00H to Nontarget Insects.**

Nontarget Insect Toxicity					
Species	% ai	LC ₅₀	Toxicity category	MRID no.	Study classification
earthworm (<i>Eisenia fetida</i>)	31	>1000 mg/kg dw soil	practically nontoxic	45901819	supplimental ¹
carabid beetle (<i>Poecilus cupreus</i>)	31	>223 mL/ha (0.07 lb ai/A)	practically nontoxic	45901818	supplimental ¹
lacewing (<i>Chrysoperia carnea</i>)	31	>225 mL/ha (0.07 lb ai/A)	practically nontoxic	45901817	supplimental ¹
predatory mite (<i>typhlodromus pyri</i>)	31	>675 mL/ha	practically nontoxic	45901816	supplimental ¹
parasitoid (<i>Aphidius rhopalosiphi</i>)	31	>675 mL/ha (0.24 lb ai/A)	practically nontoxic	45901815	supplimental ¹

¹ Not an EPA guideline**Table 10. Acute Toxicity of Topramezone to Freshwater Fish.**

Freshwater Fish Acute Toxicity Under Static Conditions					
Species	% ai	LC ₅₀	Toxicity category	MRID # (author)	Study classification
Rainbow trout	95.8	>97.4 mg ai/L	practically nontoxic	45902314 (Zok, S. 2000)	acceptable
Bluegill sunfish	95.8	>100 mg ai/L	practically nontoxic	45902315 (Zok, S. 2000)	acceptable

Table 11. Acute Toxicity of Topramezone Primary Degradate (M670H05) to Freshwater Fish.

Freshwater Fish Acute Toxicity Under Static Conditions					
Species	% ai	Toxicity value	Toxicity category	MRID # (author)	Study Classification
Rainbow trout	99.3	>100 mg M670H05/L	practically nontoxic	46242706 (Bögi, C. 2003)	acceptable

Table 12. Acute Toxicity of Topramezone End Use Product (BAS 670 00H) to Freshwater Fish.

Freshwater Fish Acute Toxicity Under Static Conditions					
Species	% ai	Toxicity value	Toxicity category	MRID # (author)	Study Classification
Rainbow trout	30	>100 mg EP/L	practically nontoxic	45901813 (Zok, S. 2001)	acceptable

Table 13. Early Life-Stage Toxicity of Topramezone to Freshwater Fish.

Freshwater Fish Chronic Toxicity Under Flow-Through Conditions						
Species	% ai	NOAEC	LOAEC	Endpoints Affected	MRID No. (Author)	Study Classification
Rainbow trout (<i>Oncorhynchus mykiss</i>)	95.8	2.93 mg ai/L	9.01 mg ai/L	wet weight, length, juvenile survival; abnormalities included decreased growth (reduction of body length) in juveniles.	45902321 (Zok, S. 2000)	acceptable

Table 14. Acute Toxicity of Topramezone to Freshwater Invertebrates.

Freshwater Invertebrate Acute Toxicity Under Static Conditions					
Species	% ai	EC ₅₀	Toxicity category	MRID # (author)	Study Classification
Water flea	95.8	>100 mg ai/L	practically nontoxic	45902316 (Jatzek, 2002)	acceptable

Table 15. Acute Toxicity of Topramezone Primary Degradate (M670H05) to Freshwater Invertebrates.

Freshwater Invertebrate Acute Toxicity Under Static Conditions					
Species	% ai	EC ₅₀	Toxicity category	MRID No. (author)	Study Classification
Water flea	99.3	>100 mg M670H05/L	practically nontoxic	46242705 (Jatzek, 2003)	acceptable

Table 16. Acute Toxicity of Topramezone End Use Product (BAS670 00H) to Freshwater Invertebrates.

Freshwater Invertebrate Acute Toxicity Under Static Conditions					
Species	% ai	EC ₅₀	Toxicity category	MRID # (author)	Study Classification
Water flea	30	>100 mg EP/L	practically nontoxic	45901820 (Funk, 2002)	acceptable

Table 17. Chronic Toxicity of Topramezone to Freshwater Invertebrates.

Freshwater Invertebrate Life-Cycle Toxicity Under Semi-Static Conditions.						
Species	% ai	21-day NOAEC (ppm)	LOAEC (ppm)	Endpoints Affected	MRID No. Author/Year	Study Classification
Waterflea (<i>Daphnia magna</i>)	95.8	48.6	97.5	mean number of live offspring produced per female daphnid	45902320 (Jatzek 2002.)	Supplemental ¹

¹ Dry weight of surviving daphnids were not measured.

Table 18. Acute Toxicity of Topramezone to Estuarine and Marine Fish

Estuarine and Marine Fish Acute Toxicity Under Static Condition					
Species	% ai	LC ₅₀	Toxicity category	MRID # (author)	Study classification
Sheepshead minnow	95.8	>119 mg ai/L	practically nontoxic	45902319 (Palmer, S.J., T.Z. Kendall, H.O. Krueger, and C.M. Holmes. 2001)	acceptable

Table 19. Acute Toxicity of Topramezone to Estuarine and Marine Invertebrates

Estuarine and Marine Invertebrate Acute Toxicity Under Static and Semi-Renewal Conditions					
Species	% ai	EC ₅₀	Toxicity category	MRID no. (author)	Study Classification
Mysid shrimp	95.8	2.7 mg ai/L	moderately toxic	45902318 (Palmer, S.J., Kendall, T.Z., Krueger, H.O., and C.M. Holmes, 2001)	acceptable
Eastern oyster (shell deposition)	95.8	>123 mg ai/L	practically nontoxic	45902317 (Palmer, S.J., Kendall, T.Z., Krueger, H.O., and C.M. Holmes, 2001)	acceptable ¹

¹ semi-renewal conditions.

Table 20. Toxicity of BAS 670 00H To Terrestrial Plants using Tier II Seedling Emergence.¹

Species	NOAEC, EC ₂₅ and Slope (lbs/A) at 21 Days								
	Seedling Emergence			Dry Weight			Height		
	Slope	NOAEC	EC ₂₅	Slope	NOAEC	EC ₂₅	Slope	NOAEC	EC ₂₅
Cabbage	n/a	0.045	>0.045	1.44	0.002	0.0039	1.35	0.0017	0.007
Lettuce	n/a	0.045	>0.045	1.72	0.005	0.007	1.49	0.005	0.012
Radish	n/a	0.045	>0.045	2.82	0.005	0.009	2.52	0.005	0.012
Soybean	n/a	0.045	>0.045	n/a	0.045	>0.045	n/a	0.045	>0.045
Tomato	n/a	0.045	>0.045	1.21	0.015	0.044	0.996	0.042	>0.045
Onion	n/a	0.045	>0.045	n/a	0.045	>0.045	n/a	0.045	>0.045
Ryegrass	n/a	0.045	>0.045	2.68	0.015	0.042	1.53	0.042	>0.045
Bean	n/a	0.045	>0.045	n/a	0.045	>0.045	n/a	0.045	>0.045
Corn	n/a	0.045	>0.045	n/a	0.045	>0.045	n/a	0.045	>0.045
Wheat	n/a	0.045	>0.045	n/a	0.045	>0.045	n/a	0.045	>0.045

¹ MRID no. 459023-27; proposed label application rate is 0.022 lb ai/A, however, test was conducted at 0.045 lb ai/A (2x max. appl. rate).
n/a - No effects seen.

Visual analysis was used to determine the effects of phytotoxicity at 17 g ai/ha or 0.015 lb ai/A to observe potential effect to plants (Table 19a) when applying at the proposed label rate of 25 g ai/ha or 0.022 lb ai/A. The test was conducted at 50 g/ha or 0.045 lb ai/A, however, the analysis for phytotoxicity at 17 g/ha instead of 50 g/ha is more appropriate to observe actual phytotoxicity effects when treatment is occurring on agricultural sites. Analysis shows the conditions of



surviving seedlings at the proposed application of 25 g ai/ha show bean, corn, and wheat were generally normal and not effected. Soybean, ryegrass, onion, and lettuce were moderately effected with an increase in phytotoxicity of chlorosis, leaf curl and necrosis observed but appears to recover back to normal levels. Radish, tomato and cabbage were detrimentally effected with a pronounce increase in phytotoxicity of chlorosis, leaf curl and necrosis.

Table 20a. Phytotoxicity of **BAS670 00H** to Terrestrial Plants using Tier II Seedling Emergence.

Plant Injury Index at 17 g ai/ha or 0.015 lb ai/A *									
Soybean	Lettuce	Radish	Tomato	Bean	Cabbage	Wheat	Ryegrass	Corn	Onion
4-12% LC, CL	13-49% CL, N	33-63% LC, CL, N	22-65% N	n/a	20-65% LC, CL, N	n/a	2-13% CL, N	n/a	0-6% N

* 0% = No effect; 10% = Effect barely noticeable; 20% = Some effect, not apparently detrimental; 30% = Effect more pronounced, not obviously detrimental; 40% = Effect moderate, plants appear able to recover; 50% = More lasting effect, recovery doubtful; 60% = Lasting effect, recovery doubtful; 70% = Heavy injury, loss of individual leaves; 80% = Plant nearly destroyed, a few surviving leaves; 90% = Occasional surviving leaves; 100% = plant death. CL = Chlorosis; LC = Leaf Curl; N = Necrosis; S = Stunting; D = mildew

Table 21. Toxicity of **BAS 670 00H** To Terrestrial Plants using Tier II Vegetative Vigor. ¹

Species	NOAEC, EC ₂₅ and Slope (lbs/A) at 21D								
	Survival			Dry weight			Height		
	slope	NOAEC	EC ₂₅	slope	NOAEC	EC ₂₅	slope	NOAEC	EC ₂₅
Soybean	n/a	0.045	>0.045	0.893	[0.000009] ^A	0.0001	0.688	[0.00004]	0.001
Lettuce	NP ¹	0.002	0.005	3.64	0.0002	0.001	4.35	0.0017	0.003
Radish	2.11	0.002	0.004	1.17	0.0006	0.0002	1.9	0.001	0.003
Tomato	2.97	0.005	0.01	1.73	0.0002	0.0005	1.04	0.001	0.002
Bean	1.75	0.015	>0.045	1.5	[0.0004]	0.002	1.09	0.0017	0.009
Cabbage	2.8	0.002	0.005	1.92	[0.00015]	0.0005	1.21	0.001	0.002
Wheat	n/a	0.034	>0.034	2.56	0.015	0.029	n/a	0.034	>0.034
Ryegrass	NO DATA			n/a	0.034	>0.034	n/a	0.034	>0.034
Corn	n/a	0.045	>0.045	n/a	0.045	>0.045	n/a	0.045	>0.045
Onion	3.17	0.015	>0.045	1.02	0.005	0.01	2.14	0.015	0.041

¹ MRID no. 459023-28; proposed label application rate is 25 g ai/A, however, test was conducted at 50 g ai/A (2x max. appl. rate).

^A [EC₀₅]

Visual analysis was used to determine the effects of phytotoxicity at 17 g ai/ha or 0.015 lb ai/A to observe potential effect to plants (**Table 20a**) when applying at the proposed label rate of 25 g ai/ha or 0.022 lb ai/A. The test was conducted at 50 g/ha or 0.045 lb ai/A, however, the analysis for phytotoxicity at 17 g/ha instead of 50 g/ha is more appropriate to observe actual phytotoxicity effects when treatment is occurring on agricultural sites. Analysis shows the conditions of growing plants at the proposed application of 25 g ai/ha show corn, onion and ryegrass were generally normal and not effected. Wheat appears to be normal with a slight increase of chlorosis, leaf curl, necrosis and mildew. Bean was detrimentally effected with a pronounce increase in phytotoxicity of necrosis. Soybean, lettuce, radish, tomato and cabbage were nearly



destroyed with some approaching death and a pronounced increase in phytotoxicity of leaf curl, chlorosis, necrosis and stunting.

Table 21a. Phytotoxicity of BAS670 00H to Terrestrial Plants using Tier II Vegetative Vigor.

Plant Injury Index at 17 g ai/ha or 0.015 lb ai/A*									
Soybean	Lettuce	Radish	Tomato	Bean	Cabbage	Wheat	Ryegrass	Corn	Onion
82-90% LC, N	100% S, N	90-100% CL, LC, N	90-94% CL, LC, N, S	28-64% N	96-100% LC, N	4-14% CL, LC, N, D	0-3% N	0%	0-6% N

* 0% = No effect; 10% = Effect barely noticeable; 20% = Some effect, not apparently detrimental; 30% = Effect more pronounced, not obviously detrimental; 40% = Effect moderate, plants appear able to recover; 50% = More lasting effect, recovery doubtful; 60% = Lasting effect, recovery doubtful; 70% = Heavy injury, loss of individual leaves; 80% = Plant nearly destroyed, a few surviving leaves; 90% = Occasional surviving leaves; 100% = plant death. CL = Chlorosis; LC = Leaf Curl; N = Necrosis; S = Stunting; D = mildew

A vegetative vigor **field study** was submitted (MRID 46460702) to observe the effect of topramezone's formulated product **BAS670 00H** including an adjuvant (DASH HC) to pea under field conditions. Results indicate that the response of pea plants from treatment conditions did not differ from control plants with the exception of the two highest treatment levels (0.5 + 0.2233 and 0.1005 lb BAS 670 00H/A + 0.4465 lb DASH HC/A). The phytotoxic effects in the 0.5 + 0.2233 and 0.1005 lb BAS 670 00H/A + 0.4465 lb DASH HC/A were 33 and 85%, respectively. The EC₂₅ was determined to be 0.048 lb BAS 670 00H/A + 0.22 lb DASH HC/A. The NOAEC was 0.025 lb BAS 670 00H./A + 0.1116 lb DASH HC/A. The study is classified as supplemental because it is unknown whether the effects were caused by the adjuvant or the end use product. A solvent control for the adjuvant DASH HC was not tested. In addition, there was no indication whether the control plots were separated from treated plot to prevent cross-contamination between plots.

Table 22. Toxicity of Topramezone to Aquatic Plants using Tier II.

Nontarget Aquatic Plant Toxicity (Tier II)

Species	% ai	EC ₅₀	NOAEC	MRID # (author)	Study classification
Vascular species:					
Duckweed	95.8	0.008 mg ai/L	0.001 mg ai/L	45902329 (Dohmen, G.P. 2002)	acceptable
Nonvascular species:					
<i>Anabaena flos-aquae</i>	95.8	>100 mg ai/L	100 mg ai/L	45902330 (Kubitza, J. 2001)	acceptable
<i>Skeletonema costatum</i>	95.8	49 mg ai/L	3 mg ai/L	45902331 (Palmer, S.J., T.Z. Kendall, H.O. Krueger, C.M. Holmes. 2002)	acceptable
<i>Pseudokirchneriella subcapitata</i>	95.8	17 mg ai/L	3 mg ai/L	45902333 (Kubitza, J. 2001)	acceptable
<i>Navicula pelliculosa</i>	95.8	47 mg ai/L	30 mg ai/L	45902332 (Palmer, S.J., T.Z. Kendall, H.O. Krueger, C.M. Holmes. 2002)	invalid ¹

¹ Significant inhibition occurred in the two highest treatments which also had pH values substantially lower than the recommended 7.5 ± 0.1, throughout the duration of the test. As a result, it was not possible to differentiate between pH or active ingredient effects on toxicity to the diatoms.



Table 23. Toxicity of Topramezone Primary Degradate (M670H05) to Aquatic Plants using Tier II.

Nontarget Aquatic Plant Toxicity (Tier II)

Species	% ai	EC ₅₀	NOAEC	MRID # (author)	Study classification
Vascular species:					
Duckweed	99.3	0.36 mg ai/L	0.0067 mg ai/L	46242704 (Junker, M. 2003)	acceptable

Table 24. Toxicity of BAS 670 00H (end use product) to Aquatic Plants using Tier II.

Nontarget Aquatic Plant Toxicity (Tier II)

Species	% ai	EC ₅₀	NOAEC	MRID # (author)	Study classification
Vascular species:					
Duckweed	30	0.0296 mg ai/L	0.0023 mg ai/L	45901821 (Junker, M. 2002)	acceptable

