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CASE GS0178 GLYPHOSATE STUDY 22 PM 25 06/16/83

CHEM 103601 Isopropylamine glyphosate

BRANCH EFB DISC 30 TOPIC

FORMULATION 90 - FORMULATION NOT IDENTIFIED

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Comes, R.D. 1975. Residues and persistence of glyphosate in irrigation water. In Determination of residues of glyphosate and its metabolite in aquatic use of Roundup herbicide.

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CONCLUSION:

Field Dissipation - Aquatic and Aquatic Impact Uses

This study is scientifically invalid because the recovery of glyphosate from fortified water samples was too variable to accurately assess the dissipation of glyphosate from flowing irrigation canal water. In addition, this study would not fulfill EPA Data Requirements for Registering Pesticides because the test substance was not characterized, soil samples were not analyzed, complete field test data were not reported, and the formation and decline of degradates other than aminomethylphosphonic acid was not addressed.

MATERIALS AND METHODS:

Five- and nine-mile earthen bottom irrigation canals, located in Prosser, Washington, were treated with glyphosate (test substance uncharacterized, source unspecified), at 150 ppb. Approximately 1 mile of flowing irrigation water was treated by metering the test substance into the canals, and marking the treated water with a dye. The canal water characteristics are presented in Table 1. Sampling stations were located upstream from the treated site, and downstream at 0.2 and 1.0 mile, and thereafter at 2-mile increments. Eight water samples were taken at each sampling station downstream from the application site. The first sample commenced as the dye started past the sampling station, and the last sample was taken immediately after the end of the dye had past the sampling station.

Water samples were analyzed for glyphosate and the degradate aminomethylphosphonic acid as described in Study 17 (00039381-C). Recovery values for water samples fortified with 2.5-100 ppb glyphosate, from both canals, ranged from ~45 to 113%. Recovery values of water samples from the East Canal fortified with aminomethylphosphonic acid at 2.5-100 ppb ranged from 64 to 96%. Aminomethylphosphonic acid recoveries from water samples of the No. 4 Canal, when fortified with 2.5-5.0 ppb, ranged from 68 to 92%. The detection limit was 2.5 ppb for both parent and degradate.

REPORTED RESULTS:

Average water temperatures for the East Canal and No. 4 Canal were 54 and 48 F, respectively.

Glyphosate concentrations in irrigation water of the East Canal and No. 4 Canal, treated with glyphosate at 150 ppb, are presented in Table 2. Glyphosate concentrations slowly dissipated from both canals as the distance from the treatment site increased. Maximum concentrations of glyphosate in East Canal and No. 4 Canal were detected at the first sampling station (0.2 mile) downstream from the treatment site at 153 and 161 ppb, respectively. Glyphosate concentrations decreased to 119 ppb at the last sampling station (5 miles) in the East Canal, and to 90 ppb at the last sampling station (9 miles) in No. 4 Canal. Concentrations of aminomethylphosphonic acid were below the limit of detection (2.5 ppb) at all sampling intervals and stations for both canals. Neither parent nor degradate was detected (2.5 ppb) in the control (upstream) samples from either canal.

DISCUSSION:

1. The test substance was not characterized.

2. Soil samples were not analyzed.

3. The recovery of glyphosate from fortified water samples varied from 45 to 113% for the No. 4 Canal and from 62 to 95% for the East Canal. This much variability makes the dissipation of glyphosate from flowing irrigation water difficult to discern.

4. Complete water characteristics, including oxygen contents and percent suspended solids, were not presented. Additionally, soil characteristics of the canals, such as textural analysis, pH, organic matter contents, and CEC, were not reported.

Table 1. Water characteristics.

	pH	Total alkalinity ($CaCO_3$)	Total hardness ($CaCO_3$)	Temperature (F)	Flow volume (cfs)
East Canal	7.5	120	100	54	60
No. 4 Canal	7.3	84	65	48	70

Table 2. Glyphosate concentrations (ppb) in water from two canals treated with glyphosate at 150 ppb.

Sampling site (miles)	Sampling interval (min.)		Concentration (ppb)	
	East Canal	No. 4 Canal	East Canal	No. 4 Canal
0.2	1	1	28	16
	9	10	153	149
	17	19	116	150
	25	28	123	161
	33	37	125	154
	41	46	118	145
	49	55	114	--[a]
	57	64	5	24
1.0	1	1	ND[b]	ND
	10	13	63	78
	19	25	127	109
	28	37	118	109
	37	49	100	106
	46	61	122	96
	55	73	124	21
	64	85	37	ND
3.0	1	1	4	ND
	10	15	64	21
	19	29	129	--
	28	43	124	--
	37	57	127	--
	46	71	116	65
	55	85	64	18
	64	99	12	ND
5.0	1	1	4	ND
	11	16	49	34
	21	31	66	74
	31	46	92	91
	41	61	119	108
	51	76	93	74
	61	91	23	16
	71	106	6	4
7.0	--	1	--	5
	--	16	--	31
	--	31	--	55
	--	46	--	103
	--	61	--	99
	--	76	--	61
	--	91	--	20
	--	106	--	4
9.0	--	1	--	ND
	--	17	--	19
	--	33	--	64
	--	49	--	90
	--	65	--	76
	--	81	--	48
	--	97	--	20
	--	113	--	5

[a] Not reported.

[b] Not detected; detection limit was 2.5 ppb.