US EPA ARCHIVE DOCUMENT

CASwell # 889

COPY

Shaughnessy No. 036101

Date out EFB: 17 JAN 1984

To: Mountfort
Product Manager 23
Registration Division (TS-767)

From: Samuel Creeger, Chief
Review Section No. 1
Exposure Assessment Branch
Hazard Evaluation Division (TS-769)

Attached please find the environmental fate review of:

Reg./File No: 001471-00070

Chemical: Trifluralin

Type Product: Herbicide

Product Name:

Company Name: Elanco

Submission Purpose: response to PR notice 83-4 and 83-4A

ZBB Code: ?

ACTION CODE: 400

Date in: 9/27/83

EFB # 3547

Date completed: 1/16/84

Tais (level II)	Days
62	1.5

Deferrals To:

_____ Ecological Effects Branch

_____ Residue Chemistry Branch

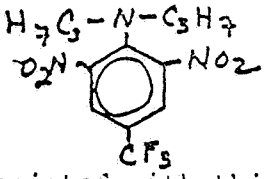
_____ Toxicology Branch

1.0 INTRODUCTION

Elanco Products Company has submitted data in response to PR notices 83-4 and 83-4A for the herbicide trifluralin (a,a,a trifluoro-2,6-dinitro-N,N-dipropyl-p-toluidine).

2.0 CHEMICAL STRUCTURE AND DIRECTIONS FOR USE

Chemical Structure:



No use pattern is associated with this submission.

3.0 DISCUSSION OF DATA

3.1 Octanol/Water Partition Coefficient of Trifluralin. Day, E.W., Saunders, D.G., and Loh, A. Lilly Reasearch Laboratories. I-EWD-83-24. September 15, 1983. Acc. No. 251255.

Procedure:

Trifluralin was added to water saturated with n-octanol and shaken. After shaking, the solution was allowed to stand overnight and was then centrifuged. Samples of the aqueous phase were taken for analysis.

Samples were extracted with dicholormethane, dried over sodium sulfate and evaporated to dryness. The residue was dissolved in benzene and the amount of trifluralin measured by EC-GC.

Results:

The results are shown below:

C_{oct} (g/ml)	C_{aq} (g/ml)	K_{ow} ($X10^{-5}$)	Log K_{ow}
	Run 1		
5,000	.0325	1.54	5.19
5,000	.0325	1.54	5.19
5,000	.0525	0.95	4.98
5,000	.0420	1.19	5.08
	Run 2		
5,000	.044	1.14	5.06
5,000	.045	1.11	5.05
500	.00435	1.15	5.06
500	.0062	0.81	4.91
	Average	1.18 ±.12	5.07 ±.09

Conclusions:

The octanol/water coefficient of trifluralin is 118,000.

TABLE I

TRIFLURALIN HYDROLYSIS

GC Data, pH 3, 0.2 ppm

Temperature (Degrees C)	Time (Days)	ppm Aqueous A	ppm Aqueous B	ppm Aqueous Average	% of Initial
25°	0	0.23	0.23	0.22 1/	100.0
	4	0.22	0.21	0.22	100.0
	8	0.23	0.24	0.24	109.1
	16	0.22	0.23	0.23	104.5
	32	0.22	0.24	0.23	104.5
37°	0	0.23	0.22	0.22 1/	100.0
	4	0.22	0.21	0.22	100.0
	8	0.23	0.23	0.23	104.5
	16	0.22	0.23	0.23	104.5
	32	0.23	0.22	0.23	104.5
52°	0	0.22	0.20	0.22 1/	100.0
	4	0.21	0.22	0.22	100.0
	8	0.24	0.23	0.24	109.1
	16	0.22	0.23	0.23	104.5
	32	0.23	0.24	0.24	109.1

TABLE II

TRIFLURALIN HYDROLYSIS

GC Data, pH 6, 0.2 ppm

Temperature (Degrees C)	Time (Days)	ppm Aqueous A	ppm Aqueous B	ppm Aqueous Average	% of Initial
25°	0	0.23	0.24	0.23 1/	100.0
	4	0.21	0.21	0.21	91.3
	8	0.20	0.22	0.21	91.3
	16	0.23	0.23	0.23	100.0
	32	0.24	0.23	0.24	104.3
37°	0	0.23	0.21	0.23 1/	100.0
	4	0.20	0.22	0.21	91.3
	8	0.23	0.23	0.23	100.0
	16	0.24	0.25	0.25	108.6
	32	0.23	0.24	0.24	104.3
52°	0	0.23	0.23	0.23 1/	100.0
	4	0.21	0.21	0.21	91.3
	8	0.22 2/	0.23	0.23	100.0
	16		0.23	0.23	100.0
	32	0.23	0.23	0.23	100.0

TABLE III

TRIFLURALIN HYDROLYSIS

GC Data, pH 9, 0.2 ppm

Temperature (Degrees C)	Time (Days)	ppm Aqueous A	ppm Aqueous B	ppm Aqueous Average	% of Initial
25°	0	0.21	0.21	0.21 1/	100.0
	4	0.22	0.23	0.23	109.5
	8	0.22	0.23	0.23	109.5
	16	0.22	0.22	0.22	104.8
	32	0.23	0.23	0.23	109.5
37°	0	0.22	0.18	0.21 1/	100.0
	4	0.20	0.21	0.21	100.0
	8	0.05 2/	0.23	0.23	109.5
	16	0.23	0.23	0.23	109.5
	32	0.23	0.24	0.24	114.3
52°	0	0.20	0.21	0.21 1/	100.0
	4	0.21	0.19	0.20	95.2
	8	0.23	0.23	0.23	109.5
	16	[illegible]	[illegible]	[illegible]	[illegible]

TABLE IV

TRIFLURALIN HYDROLYSIS

GC Data, pH 3, 0.04 ppm

Temperature (Degrees C)	Time (Days)	ppm Aqueous A	ppm Aqueous B	ppm Aqueous Average	% of Initial
25°	0	0.041	0.040	0.041 1/	100.0
	4	0.044	0.042	0.043	104.9
	8	0.045	0.042	0.044	107.3
	16	0.044	2/	0.044	107.3
	32	0.044	0.042	0.043	104.9
37°	0	0.040	0.042	0.041 1/	100.0
	4	0.040	0.043	0.042	102.4
	8	0.042	0.045	0.044	107.3
	16	0.042	0.044	0.043	104.9
	32	0.041	0.043	0.042	102.4
52°	0	0.040	0.041	0.041 1/	100.0
	4	0.043	0.046	0.045	109.8
	8	0.045	0.044	0.045	109.8
	16	0.044	0.044	0.044	107.3
	32	0.044	0.038	0.041	100.0

TABLE V

TRIFLURALIN HYDROLYSIS

GC Data, pH 6, 0.06 ppm

Temperature (Degrees C)	Time (Days)	ppm Aqueous A	ppm Aqueous B	ppm Aqueous Average	% of Initial
25°	0	0.042	0.037	0.042 1/	100.0
	4	0.043	0.047	0.045	107.1
	8	0.042	0.032	0.037	88.1
	16	0.043	0.043	0.043	102.4
	32	0.044	0.041	0.043	102.4
37°	0	0.0422	0.0457	0.0442 1/	100.0
	4	0.045	0.046	0.046	109.5
	8	0.043	0.017 2/	0.043	102.4
	16	0.044	0.043	0.046	109.5
	32	0.041	0.020 3/	0.0412	97.6
52°	0	0.0425	0.0425	0.0425 1/	100.0
	4	0.0477	0.0477	0.0477	112.0
	8	0.0462	0.0435	0.0448	105.6
	16	0.0444	0.0433	0.0444	104.8
	32	0.0412	0.0463	0.0438	102.4

TABLE VI

TRIFLURALIN HYDROLYSIS

GC Data, pH 9, 0.04 ppm

Temperature (Degrees C)	Time (Days)	ppm Aqueous A	ppm Aqueous B	ppm Aqueous Average	% of Initial
25°	0	0.040	0.040	0.040 1/	100.0
	4	0.040	0.042	0.041	102.5
	8	0.043	0.039	0.041	102.5
	16	0.043	0.043	0.043	107.5
	32	0.020 2/	0.041	0.041	102.5
37°	0	0.040	0.041	0.040 1/	100.0
	4	0.040	0.044	0.042	105.0
	8	0.044	0.044	0.044	110.0
	16	0.042	0.041	0.042	105.0
	32	0.040	0.028 2/	0.040	100.0
52°	0	0.041	0.040	0.040 1/	100.0
	4	0.040	0.040	0.040	100.0
	8	0.043	0.042	0.043	107.5
	16	[illegible]	[illegible]	[illegible]	[illegible]

TABLE VII

TRIFLURALIN HYDROLYSIS

Radiochemical Data, pH 3, 0.2 ppm

Aqueous Solution Before Extraction

Temperature (Degrees C)	Time (Days)	DPM/Sample A	DPM/Sample B	DPM/Sample Average	% of Initial
25°	0	63,416	66,023	66,321 1/	100.0
	4	63,410	62,937	63,174	95.3
	8	64,383	64,682	64,533	97.3
	16	62,227	63,844	63,036	95.0
	32	59,776	68,296	61,036	92.0
37°	0	66,471	65,468	66,321 1/	100.0
	4	64,541	65,238	64,890	97.8
	8	68,765	64,567	64,167	96.8
	16	65,707	63,268	64,488	97.2
	32	67,493	61,621	64,557	97.3
52°	0	66,189	70,364	66,321 1/	100.0
	4	62,644	68,277	62,962	94.9
	8	61,031	65,182	63,107	95.2
	16	60,630	62,819	61,725	93.1
	32	64,075	68,742	63,909	96.4

TABLE VIII

TRIFLURALIN HYDROLYSIS

Radiochemical Data, pH 6, 0.2 ppm

Aqueous Solution Before Extraction

Temperature (Degrees C)	Time (Days)	DPM/Sample A	DPM/Sample B	DPM/Sample Average	% of Initial
25°	0	65,172	55,159	64,283 1/	100.0
	4	63,980	63,146	63,563	98.9
	8	64,168	64,467	64,318	100.1
	16	62,513	62,963	62,738	97.6
	32	60,864	65,189	64,527	100.4
37°	0	66,405	65,797	64,283 1/	100.0
	4	62,044	67,477	64,761	100.7
	8	69,488	63,203	68,346	98.5
	16	62,948	67,645	65,297	101.6
	32	64,185	69,097	65,641	102.1
52°	0	66,395	65,772	64,283 1/	100.0
	4	68,530	65,037	66,784	103.8
	8	66,489	62,228	64,359	100.1
	16	2/	60,099	60,099	93.5
	32	68,609	68,466	68,538	98.8

TABLE IX

TRIFLURALIN HYDROLYSIS

Radiochemical Data, pH 9, 0.2 ppm

Aqueous Solution Before Extraction

Temperature (Degrees C)	Time (Days)	DPM/Sample A	DPM/Sample B	DPM/Sample Average	% of Initial
25°	0	63,794	61,627	62,401 1/	100.0
	4	62,231	66,147	64,189	102.9
	8	64,861	63,147	64,004	102.6
	16	64,822	63,317	64,070	102.7
	32	64,029	63,763	63,896	102.4
37°	0	66,753	59,864	62,401 1/	100.0
	4	64,466	63,269	63,873	102.4
	8	14,678 2/	62,695	62,695	100.5
	16	63,787	68,434	63,111	101.1
	32	62,442	63,077	62,760	100.6
52°	0	68,980	51,385	62,401 1/	100.0
	4	65,913	65,177	65,545	105.0

TABLE XIII

TRIFLURALIN HYDROLYSIS

Radiochemical Data, pH 3, 0.04 ppm

Aqueous Solution Before Extraction

Temperature (Degrees C)	Time (Days)	DPM/Sample A	DPM/Sample B	DPM/Sample Average	% of Initial
25°	0	10,818	12,420	11,374 1/	100.0
	4	12,408	11,452	11,930	104.9
	8	11,739	12,922	12,331	108.4
	16	11,473	2/	11,473	100.9
	32	12,100	11,329	11,715	103.0
37°	0	2/	11,936	11,374 1/	100.0
	4	12,996	14,972	13,984	122.9
	8	11,716	13,126	12,421	109.2
	16	12,140	12,961	12,552	110.3
	32	11,115	12,692	11,906	104.7
52°	0	10,884	10,864	11,374 1/	100.0
	4	12,998	12,142	12,569	110.5
	8	12,227	12,719	12,473	109.7
	16	12,379	12,284	12,332	108.4
	32	12,342	11,216	11,779	103.6

TABLE XIV

TRIFLURALIN HYDROLYSIS

Radiochemical Data, pH 6, 0.04 ppm

Aqueous Solution Before Extraction

Temperature (Degrees C)	Time (Days)	DPM/Sample A	DPM/Sample B	DPM/Sample Average	% of Initial
25°	0	12,018	11,304	12,178 1/	100.0
	4	12,558	12,536	12,569	103.2
	8	12,207	9,437 2/	12,207	100.2
	16	12,203	13,411	12,807	105.2
	32	11,869	12,036	11,952	98.1
37°	0	12,617	13,061	12,178 1/	100.0
	4	12,036	12,586	12,310	101.1
	8	11,512	3/	11,512	94.5
	16	12,930	13,071	13,000	106.8
	32	12,298	6,136 2/	12,298	101.0
52°	0	12,428	11,645	12,178 1/	100.0
	4	13,656	13,818	13,748	112.8
	8	12,727	11,637	12,182	100.0
	16	13,117	10,668	11,900	97.8
	32	12,331	12,709	12,520	102.8

TABLE XV

TRIFLURALIN HYDROLYSIS

Radiochemical Data, pH 9, 0.04 ppm

Aqueous Solution Before Extraction

Temperature (Degrees C)	Time (Days)	DPM/Sample A	DPM/Sample B	DPM/Sample Average	% of Initial
25°	0	12,440	12,249	11,986 1/	100.0
	4	12,070	11,992	12,031	100.4
	8	12,222	12,039	12,131	101.2
	16	12,010	11,534	11,772	98.2
	32	5,079 2/	11,224	11,224	93.6
37°	0	11,665	12,478	11,986 1/	100.0
	4	13,073	12,232	12,653	105.6
	8	12,346	11,950	12,148	101.4
	16	12,595	12,067	12,331	102.9
	32	11,512	7,267 2/	11,512	96.0
52°	0	11,655	11,428	11,986 1/	100.0

TABLE X.

TRIFLURALIN HYDROLYSIS

Radiochemical Data, pH 3, 0.2 ppm

Dichloromethane Extract

Temperature (Degrees C)	Time (Days)	DPM/Sample A	DPM/Sample B	DPM/Sample Average	% of Initial
25°	0	66,727	70,111	65,369 1/	100.0
	4	62,219	62,150	62,185	95.1
	8	67,350	71,633	69,492	106.3
	16	63,006	67,342	65,174	99.7
	32	66,071	74,752	70,412	107.7
37°	0	66,608	64,884	65,369 1/	100.0
	4	64,573	61,364	62,969	96.3
	8	69,434	69,324	69,379	106.1
	16	66,027	70,740	68,384	104.6
	32	73,100	63,287	68,184	104.3
52°	0	63,951	59,922	65,369 1/	100.0
	4	61,036	66,399	63,968	97.9
	8	73,576	69,022	71,299	109.1
	16	65,856	69,627	67,742	103.6
	32	69,996	67,702	68,849	105.3

TABLE XI.

TRIFLURALIN HYDROLYSIS

Radiochemical Data, pH 6, 0.2 ppm

Dichloromethane Extract

Temperature (Degrees C)	Time (Days)	DPM/Sample A	DPM/Sample B	DPM/Sample Average	% of Initial
25°	0	66,916	72,543	67,788 1/	100.0
	4	60,092	59,587	59,840	88.3
	8	61,403	66,009	63,706	94.0
	16	67,611	68,849	68,230	100.7
	32	71,658	69,286	70,472	104.0
37°	0	71,930	61,050	67,788 1/	100.0
	4	55,240	63,727	59,484	87.8
	8	68,990	70,107	69,549	102.6
	16	68,231	71,787	70,009	103.3
	32	68,468	71,281	69,872	103.1
52°	0	63,656	70,630	67,788 1/	100.0
	4	60,275	61,720	60,998	90.0
	8	64,223	70,542	67,383	99.4
	16	2/	66,564	66,564	98.2
	32	69,758	69,308	69,533	102.6

TABLE XII.

TRIFLURALIN HYDROLYSIS

Radiochemical Data, pH 9, 0.2 ppm

Dichloromethane Extract

Temperature (Degrees C)	Time (Days)	DPM/Sample A	DPM/Sample B	DPM/Sample Average	% of Initial
25°	0	59,476	60,977	59,593 1/	100.0
	4	64,552	70,360	67,456	113.0
	8	68,809	70,778	69,794	117.1
	16	65,553	68,946	67,250	112.8
	32	67,852	69,127	68,490	114.9
37°	0	64,775	54,082	59,593 1/	100.0
	4	62,313	60,314	61,314	102.9
	8	16,311 2/	65,956	65,956	110.7
	16	65,479	68,947	67,223	112.8
	32	66,480	70,333	68,407	114.8
52°	0	57,310	60,937	59,593 1/	100.0
	4	61,392	57,222	59,357	99.6
	8	70,297	69,072	69,685	116.9
	16	66,733	68,319	67,776	113.7
	32	69,490	71,500	70,495	[illegible]

TABLE XVI.

TRIFLURALIN HYDROLYSIS

Radiochemical Data, pH 3, 0.04 ppm

Dichloromethane Extract

Temperature (Degrees C)	Time (Days)	DPM/Sample A	DPM/Sample B	DPM/Sample Average	% of Initial
25°	0	12,064	11,600	11,944 1/	100.0
	4	13,150	12,466	12,808	107.2
	8	13,679	12,630	13,155	110.1
	16	12,998	2/	12,998	108.8
	32	13,100	12,694	12,897	108.0
37°	0	12,068	11,790	11,944 1/	100.0
	4	12,002	13,046	12,524	104.9
	8	13,721	13,332	13,527	113.3
	16	12,502	12,884	12,693	106.3
	32	12,826	13,358	13,092	109.6
52°	0	11,943	12,219	11,944 1/	100.0
	4	12,955	13,350	13,153	110.1
	8	13,541	13,650	13,546	113.4
	16	13,118	13,355	13,237	110.8
	32	13,421	11,192	12,307	103.0

TABLE XVII.

TRIFLURALIN HYDROLYSIS

Radiochemical Data, pH 6, 0.04 ppm

Dichloromethane Extract

Temperature (Degrees C)	Time (Days)	DPM/Sample A	DPM/Sample B	DPM/Sample Average	% of Initial
25°	0	12,084	11,230	12,420 1/	100.0
	4	12,571	13,637	13,104	105.5
	8	12,699	8,991 2/	12,699	102.2
	16	12,556	12,515	12,536	100.9
	32	13,189	12,191	12,690	102.2
37°	0	12,424	13,073	12,420 1/	100.0
	4	12,754	13,586	13,169	106.0
	8	12,637	3/	12,637	102.7
	16	12,789	12,716	12,753	102.7
	32	12,571	5,398 2/	12,571	101.2
52°	0	13,311	12,391	12,420 1/	100.0
	4	13,955	12,435	13,195	106.2
	8	13,250	13,135	13,193	106.2
	16	12,533	12,995	12,766	102.8
	32	12,554	12,001	12,278	98.8

TABLE XVIII.

TRIFLURALIN HYDROLYSIS

Radiochemical Data, pH 9, 0.04 ppm

Dichloromethane Extract

Temperature (Degrees C)	Time (Days)	DPM/Sample A	DPM/Sample B	DPM/Sample Average	% of Initial
25°	0	11,519	12,502	11,825 1/	100.0
	4	11,337	12,767	12,052	101.9
	8	12,958	12,972	12,965	109.6
	16	12,364	12,890	12,627	106.8
	32	5,814 2/	12,707	12,707	107.5
37°	0	12,046	11,413	11,825 1/	100.0
	4	11,573	11,566	11,570	97.8
	8	13,059	13,473	13,266	112.2
	16	12,165	12,245	12,205	103.2
	32	10,959	8,514	9,737	82.3
52°	0	11,956	11,511	11,825 1/	100.0
	4	11,996	12,919	12,458	105.4
	8	12,881	13,443	13,157	[illegible]
	16	12,479	[illegible]	[illegible]	[illegible]

3.4 Radiochemical Studies with ^{14}C Trifluralin on Various Rotational Crops. Tomasz Golab. Lilly Research Laboratories. July 1983.

Ten plots at Lilly Research Laboratories in Indiana were constructed from round galvanized pipes 91.4 cm in diameter and 61 cm in height and sunk 40 cm into the soil. The plots were approximately 0.65 m^2 (7 ft^2). Five of these plots were preplant incorporated with uniformly ring-labeled ^{14}C-trifluralin at a rate of 1.0 lb/A.

Soil characteristics were:

		Percentage					
Texture	Sample	Sand	Silt	Clay	OM	pH	CEC (meq/100 g)
Silt Loam	A1	34.4	60.0	5.6	1.3	6.6	10.2
Silt Loam	A2	38.4	54.2	16.4	0.9	6.8	10.0

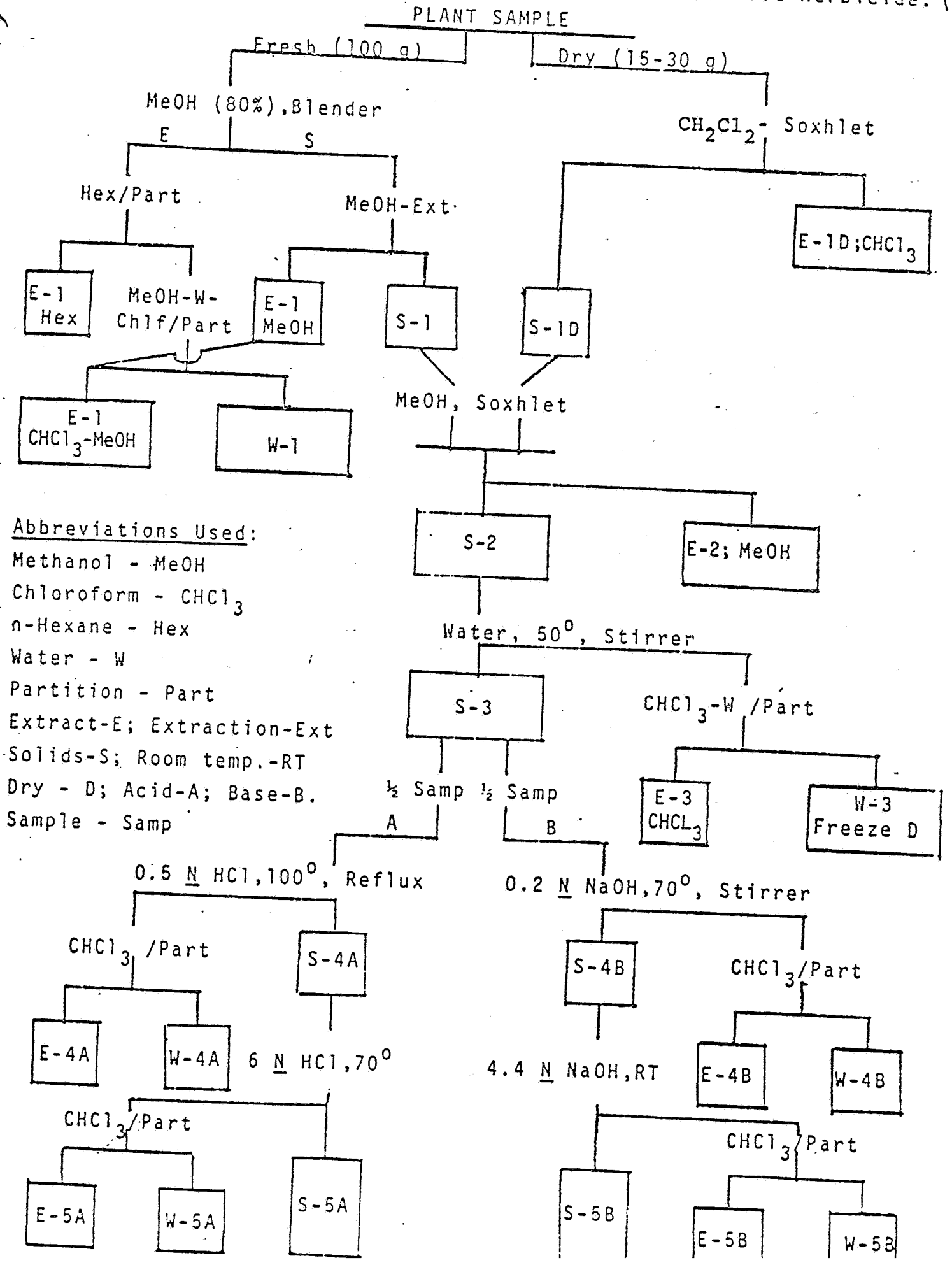
Wheat, cabbage, corn, soybeans, sugar beets, and tomatoes were rotated to soybeans.

Soil was sampled to 15 cm at 0-73 weeks after application of trifluralin. Soybeans and rotational crops were grown to maturity and sampled. Samples were also taken before maturity. The whole crop removed from the plots and separated into parts as appropriate to the crop.

Soil samples were analyzed for total radioactivity by combustion/LSC. Soil samples were also extracted with methanol and aqueous methanol, the combined extracts concentrated and the aqueous phase partitioned with chloroform and/or ethyl acetate. Aliquots of the organic and aqueous phases were taken for LSC. The amount of soil-bound radioactivity was determined from extracted soil samples by combustion/LSC. The organic extracts were subjected to TLC, GLC, LSC, radioautography (RA), TLC-RA, and TLC-RA followed by LSC to analyze for trifluralin and its degradation products. Isolated degradation products were confirmed by MS or GC-MS, when possible. In some instances, HPLC was used for separation and purification of the isolated samples prior to MS. Crude organic extracts were examined by TLC-RA. When necessary the extracts were purified and the radioactive degradation products crudely separated by gravity adsorption column chromatography or by small-bore column chromatography pressured with nitrogen. Silica gel or Florisil were used as the adsorbents.

Plant samples were analyzed for total radioactivity by combustion/LSC. Figure 1 on the next page and table 1 on page 5 show the fractionation scheme for analysis of the plant samples. An aliquot of each extract was analyzed for ^{14}C by LSC. Where possible, futher characterization of the extracted residues was performed by TLC with RA and/or LSC. After extraction, a portion of the solid residue was combusted for total radioactivity.

Scheme Fractionation of Radioactivity from Fresh and Dry Plants Grown in Soil Treated with ^{14}C Labeled Herbicide. (Schem



Abbreviations Used:

Methanol - MeOH
Chloroform - $CHCl_3$
n-Hexane - Hex
Water - W
Partition - Part
Extract-E; Extraction-Ext
Solids-S; Room temp.-RT
Dry - D; Acid-A; Base-B.
Sample - Samp

TABLE 1

SOLVENT FRACTIONATION OF PLANT MATERIAL

Step	Solvent	Conditions	Extracted Plant Constituents
1.	Dichloromethane or Chloroform (dry plants) or Methanol (fresh plants)	Soxhlet, overnight, (16-20 hrs.) Reflux. Blender, 15 min. (2 times)	Fats, oils, free triterpine alcohols, sterols, rubbers, carotenoids, chlorophylls, phospholipides, waxes, alkaloids, flavones, glycosides, etc.
2.	Methanol	Soxhlet, overnight, Reflux	Monosaccharides, glycosides, tannins, etc.
3.	Water (dist)	Agitation (stirrer magnetic or mech.) 45-55°C over weekend (60 hrs+)	Mineral salts, free amino acids, amines, amides, alkaloid salts of organic acids, carbohydrates (water soluble) glycosides, some peptides, etc.
4A.	1/2 Sample: Hydrochloric acid; 0.5N HCl	90-100°C. Reflux, overnight, stirrer	Hydrolysis of glycosides, amines, alkaloids, basic proteins, etc.
5A.	6N HCl	60-70°C, overnight, stirrer	Hydrolysis of amino acid conjugates, most of cellulose, etc.
	Solid Residue - Protopectines and Lignin		
4B.	1/2 Sample: Sodium hydroxide 0.2N NaOH, (0.8 percent)	60-70°C, overnight, stirrer	Hydrolysis of some conjugates, starch, acidic proteins, hemicellulose, organic acids (phenols, enols), etc.
5B.	4.4N NaOH, (17.5 percent)	Cold, R.T., overnight, stirrer	Mannan, xylan, hemi-cellulose, etc.
	Solid Residue - Cellulose and Lignin		

Results:

Page 6A shows a summary of the distribution of radioactivity in soil treated with ^{14}C-trifluralin. Page 7 shows the degradation scheme of trifluralin in soil. Pages 8-21 show the retention times for trifluralin and its soil degradates in various analysis systems.

The highest residues found in rotational crops was 0.143 ppm in the straw of the wheat as 1st rotational crop at 60 weeks post application. The stalks of corn as 1st rotational crop 19 weeks after application had 0.136 ppm. Residues found in the rotational crops are shown in tables 7-11 on pages 6 B-F.

Conclusions:

When crops are planted in rotation to soybeans after treatment at 1.0 lb/A (1.25 X the label rate), then the following residues are found:

(1) wheat - immature whole plant, planted 22 weeks and sampled 52 weeks weeks after application - 0.034 ppm
grain, sampled 60 weeks after application - 0.22 ppm
dry straw, sampled 60 weeks after application - 0.143 ppm

(2) corn - immature whole plant, planted 5 weeks and sampled 9 weeks after application - 0.035
dry stalks, sampled 19 weeks after application - 0.110 to 0.136 ppm
corn grain, sampled 19 weeks after application - 0.010 to 0.011 ppm
immature whole plants, planted 52 weeks and sampled 57 and 61 weeks after application 0.022 and 0.011 ppm, respectively
dry stalks, sampled 73 weeks after application - 0.037 ppm
corn grain, sampled 73 weeks after application - 0.013 ppm

(3) soybeans - immature whole plant, planted 52 weeks and sampled 58 and 61 weeks after application - 0.077 and 0.047 ppm, respectively
dry pods, sampled 73 weeks after application - 0.070 ppm
dry stems, sampled 73 weeks after application - 0.064 ppm.
dry seeds, sampled 73 weeks after application - 0.037 ppm

(4) sugar beets - roots planted 50 weeks and sampled 58, 61 and 73 after application - 0.109, 0.025, and 0.015 ppm, respectively
tops at sampled 58, 61, and 73 weeks after application - 0.055 ppm, 0.116 ppm, and 0.106 ppm, respectively

(5) cabbage - whole plant, planted 54 weeks and sampled 57 and 73 weeks after application 0.011 and 0.009 ppm, respectively

(6) tomatoes - whole plant, planted 54 weeks and sampled 61 weeks after application - 0.011 ppm
fruit, sampled 73 weeks after application - 0.001 ppm

DISTRIBUTION OF RADIOACTIVITY IN SOIL TREATED

WITH ^{14}C TRIFLURALIN

Specific Activity 4.0 uCi/mg (1 ug = 8,800 dpm)

Established May 18, 1977
Type of Application - PPI
Rate of Application - 1.125 kg/ha

PLOT: IN-77-TRE-A

ling e ks)	DPM in Air Dried Sample[1/]	Percent of Applied Radioactivity (Calculated per Surface Area) Before Extract	Extract	Soil Bound	Trifluralin	Degradation Products
	1,689,600	100.0				
	1,441,300	85.3	68.6	16.7	61.2	7.4
	1,689,600	85.1	41.7	43.4	29.8	11.9
	1,284,300	76.0	29.3	36.7	20.9	18.4
	1,173,600	69.5	23.5	46.0	11.9	12.6
	1,086,150	64.3	17.1	47.2	8.0	9.1

PLOT: IN-77-TRE-B

Sampling Time (Weeks)	DPM in Air Dried Sample[1/]	Percent of Applied Radioactivity (Calculated per Surface Area) Before Extract	Extract	Soil Bound	Trifluralin	Degradati Product
0	1,689,600	100.0				
6	1,529,150	90.5	73.0	17.5	67.0	6.0
22	1,487,600	88.1	41.5	56.6	28.7	12.8
52	1,242,000	73.5	37.7	35.8	22.6	15.1
57	1,268,300	75.1	30.3	44.8	23.4	6.9
73	1,007,836	59.6	13.8	45.8	5.9	7.9

PLOT: IN-77-TRE-C

ling s)	DPM in Air Dried Sample[1/]	Percent of Applied Radioactivity (Calculated per Surface Area) Before Extract	Extract	Soil Bound	Trifluralin	Degradation Products
	1,689,600	100.0				
	1,590,665	94.1	77.5	16.6	67.0	10.5
	1,329,700	78.7	39.3	39.4	10.3	29.0
	1,356,770	80.3	44.4	35.9	22.9	21.5
	1,214,420	71.9	38.8	33.1	14.9	23.9
	1,135,460	67.3	19.6	47.7	11.4	8.2

PLOT: IN-77-TRE-D

Sampling Time (Weeks)	DPM in Air Dired Sample[1/]	Percent of Applied Radioactivity (Calculated per Surface Area) Before Extract	Extract	Soil Bound	Trifluralin	Degradati Product
0	1,689,600	100.0				
4	1,349,174	79.9	66.4	13.5	54.5	11.9
19	1,239,645	73.4	39.5	33.9	23.2	16.3
52	1,070,949	63.4	25.8	37.6	19.7	6.1
58	1,034,860	61.2	25.5	35.7	11.8	13.7
73	922,154	54.6	13.0	41.6	6.4	6.6

PLOT: IN-77-TRE-E

Sampling Time (Weeks)	DPM in Air Dried Sample[1/]	Percent of Applied Radioactivity (Calculated per Surface Area) Before Extract	Extract	Soil Bound	Trifluralin	Degradation Products
0	1,689,600	100.0				
4	1,325,600	78.5	67.1	11.4	54.6	12.6
19	1,185,700	70.2	34.5	35.7	23.0	11.5
52	1,009,000	59.7	17.9	41.8	14.3	3.6
59	947,100	56.1	19.1	37.0	16.0	3.1
73	814,400	48.2	10.9	37.3	5.7	5.2

[1/] Each sample consisted of 6 cores taken to a depth of 15 cm.

TABLE 7

PLOT: IN-77-TRE-A

TOTAL ^{14}C RESIDUES IN PLANT TISSUES GROWN IN

^{14}C-TRIFLURALIN-TREATED[2] PLOT IN GREENFIELD, INDIANA

	Weeks After Initial Application	Control Fresh dpm/g (ppm)	Control Dry dpm/g (ppm)	Treated Fresh dpm/g (ppm)	Treated Dry dpm/g (ppm)
Wheat - First Rotational Crop					
Planting	22				
First sampling (32 wks after planting)	52	71(.008)		296(.034)	
Final sampling	60				
Seed			8(.001)		191(.022)
Straw			57(.006)		1263(.143)
Cabbage - Second Rotational Crop					
Planting	64				
First sampling (3 wks after transplanting)	67	8(.001)	---	99(.011)	---
Final sampling	73	21(.002)		68(.008)	

[1] Before extraction

[2] Application rate 1.125 kg/ha - PPI, established May 18, 1977.

TABLE 8

PLOT: IN-77-TRE-8

TOTAL ^{14}C RESIDUES IN PLANT TISSUES GROWN IN

^{14}C-TRIFLURALIN-TREATED[2] PLOT IN GREENFIELD, INDIANA

	Weeks After Initial Application	Control Fresh dpm/g (ppm)	Control Dry dpm/g (ppm)	Treated Fresh dpm/g (ppm)	Treated Dry dpm/g (ppm)
Corn - Rotational Crop					
Planting	52				
First sampling (5 wks after planting)	57	36(.004)		183(.020)	
Second sampling	61	24(.003)		99(.011)	
Third sampling	73				
Seeds			9(.001)		116(.013)
Stalks			68(.008)		322(.037)

[1] Before extraction

[2] Application rate 1.125 kg/ha - PPI, established May 18, 1977.

TABLE 9

PLOT: IN-77-TRE-C

TOTAL ^{14}C RESIDUES IN PLANT TISSUES GROWN IN

^{14}C-TRIFLURALIN-TREATED[2] PLOT IN GREENFIELD, INDIANA

	Weeks After Initial Application	Control Fresh dpm/g (ppm)	Control Dry dpm/g (ppm)	Treated Fresh dpm/g (ppm)	Treated Dry dpm/g (ppm)
Soybean - Rotational Crop					
Planting	52				
First sampling (6 wks after planting)	58	14(.001)		679(.077)	
Second sampling	61	9(.001)		414(.047)	
Third sampling	73				
Seeds			37(.004)		331(.037)
Pods			42(.005)		619(.070)
Stems			94(.016)		569(.064)

[1] Before extraction

[2] Application rate 1.125 kg/ha - PPI, established May 18, 1977.

TABLE 10

PLOT: IN-77-TRE-0

TOTAL ^{14}C RESIDUES IN PLANT TISSUES GROWN IN

^{14}C-TRIFLURALIN-TREATED[2] PLOT IN GREENFIELD, INDIANA

	Weeks After Initial Application	Control Fresh dpm/g (ppm)	Control Dry dpm/g (ppm)	Treated Fresh dpm/g (ppm)	Treated Dry dpm/g (ppm)
Corn - First Rotational Crop					
Planting	5				
First sampling (4 wks after planting)	9	7(<.001)	43(.005)	306(.035)	
Final sampling (14 wks after planting)	19				
Seeds			2(<.001)		95(.011)
Stalks			29(.003)		1199(.136)
Sugar Beet Second Rotational Crop					
Planting	50				
First sampling (8 wks after planting)	58				
Tops		8(.001)		488(.055)	
Roots		186(.021)	---	962(.109)	
Second sampling	61				
Tops		21(.002)		1023(.116)	
Roots		44(.005)		225(.025)	
Third sampling	73				
Tops		12(.001)	---	933(.106)	
Roots		1(<.001)		130(.015)	

[1] Before extraction

[2] Application rate 1.125 kg/ha - PPI, established May 18, 1977.

TABLE 11

PLOT: IN-77-TRE-E

TOTAL ^{14}C RESIDUES IN PLANT TISSUES GROWN IN

^{14}C-TRIFLURALIN-TREATED[2] PLOT IN GREENFIELD, INDIANA

	Weeks After Initial Application	Control Fresh dpm/g (ppm)	Control Dry dpm/g (ppm)	Treated Fresh dpm/g (ppm)	Treated Dry dpm/g (ppm)
Corn - First Rotational Crop					
Planting	5				
First sampling (4 wks after planting)	9	7(<.001)		306(.035)	
Final sampling (14 wks after planting)	19				
Seeds			2(< .001)		91(.010)
Stalks			29(.003)		972(.110)
Tomato - Second Rotational Crop					
Planting	54				
First sampling (5 wks after transplanting)	59	3(<.001)	---	115(.013)	---
Final sampling (10 wks after transplanting)	64	1(<.001)	---	38(.004)	---

[1] Before extraction

[2] Application rate 1.125 kg/ha - PPI, established May 18, 1977.

Fig. 2.

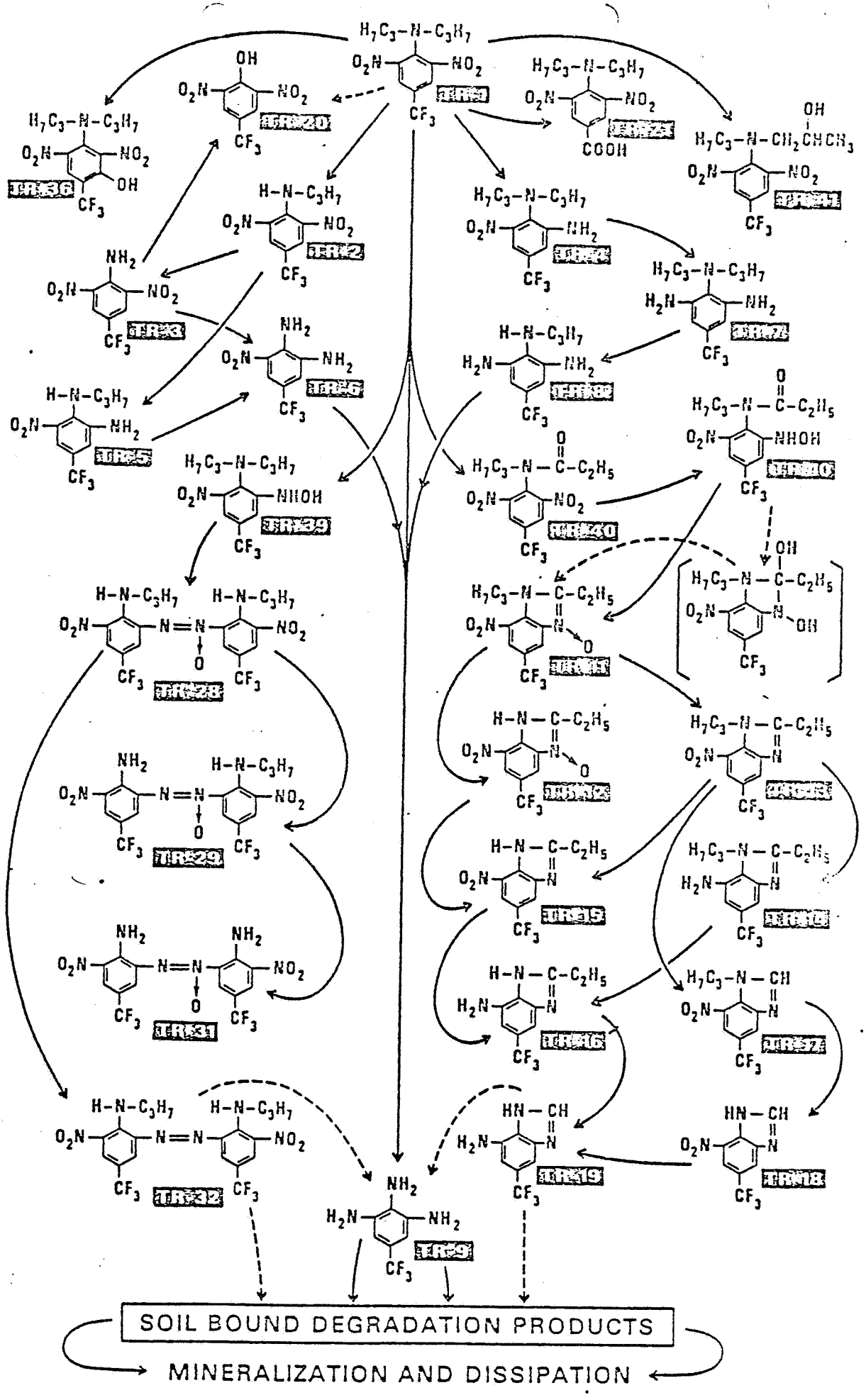

TR-1
TR-2
TR-3
TR-5
TR-6
TR-9
TR-13
TR-15
TR-16
TR-18
TR-19
TR-20
TR-24
TR-25
TR-26
TR-27
TR-28
TR-29
TR-31
TR-32
TR-36
TR-39
TR-40
SOIL BOUND DEGRADATION PRODUCTS
MINERALIZATION AND DISSIPATION

Table I. Reference Compounds, Glc Retention Times (RT)[a], Hplc Retention Volumes (RV)[b], Tlc hR_{TR} and hR_f Values[c]

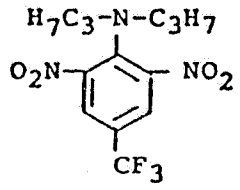
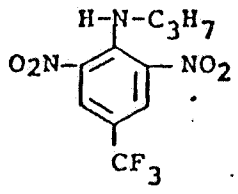
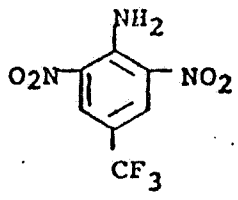
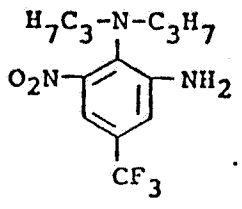
Compound (mol wt)	Structure	Name	glc-RT (min) 120°C (100°C)	glc-RT (min) 140°C (180°C)	hplc-RV (ml)	tlc solvent systems[d] 1	2	4	5	6	10	12
						hR_{TR}						
						(hR_f)						
TR-1 (335)		Trifluralin α,α,α-trifluoro-2,6-dinitro-N,N-dipropyl-p-toluidine	2.9	1.3		100						
						(76	85	86	93	88	93	87)
TR-2 (293)		α,α,α-Trifluoro-2,6-dinitro-N-propyl-p-toluidine	4.5	2.1		81	95	88	99	98	100	67
						(61	81	76	92	86	94	58)
TR-3 (251)		α,α,α-Trifluoro-2,6-dinitro-p-toluidine	3.3	1.5		34	73	33	97	79	97	--
						(26	62	28	90	70	91	--)
TR-4 (305)		α,α,α-Trifluoro-5-nitro-N^4,N^4-dipropyltoluene-3,4-diamine	7.3	3.2		78	91	53	96	96	96	--
						(59	78	46	89	85	90	--)

Table I. contd. 2.

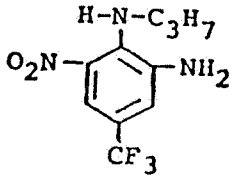
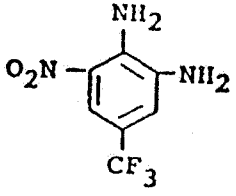
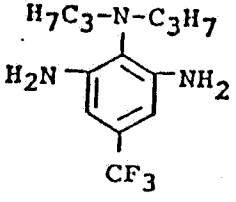
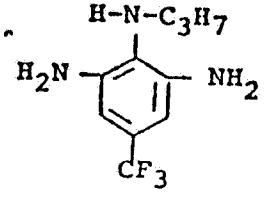
Compound (mol wt)	Structure	Name	glc-RT (min) 120°C (100°C)	glc-RT (min) 140°C (180°C)	hplc-RV (ml)	tlc solvent systems[d] 1	2	4	5	6	10	12
						hR_{TR}						
						(hR_f)						
TR-5 (263)		α,α,α-Trifluoro-5-nitro-N^4-propyl-toluene-3,4-diamine	7.6	3.4		32	65	26	91	79	91	--
						(24	55	22	84	70	85	--)
TR-6 (221)		α,α,α-Trifluoro-5-nitrotoluene-3,4-diamine		12.6		3	11	1	50	23	38	--
				(1.4)		(2	9	1	46	20	35	--)
TR-7 (275)		α,α,α-Trifluoro-N^4,N^4-dipropyl-toluene-3,4,5-triamine	5.8	2.5		28	55	47	96	67	95	--
						(22	47	40	89	59	88	--)
TR-8 (233)		α,α,α-Trifluoro-N^4-propyltoluene-3,4,5-triamine	9.9	3.9		0	0	0	11	0	32	--
						(0	0	0	10	0	29	--)

Table I. contd. 3.

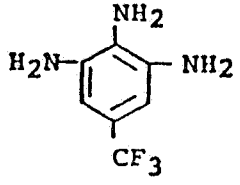
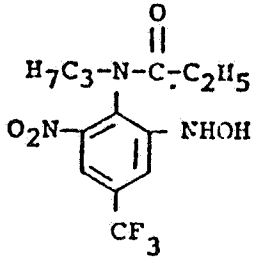
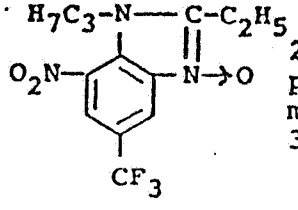
Compound (mol wt)	Structure	Name	glc-RT (min) 120°C (100°C)	glc-RT (min) 140°C (180°C)	hplc-RV (ml)	tlc solvent systems[d] 1	2	4	5	6	10	12
						----------hR_{TR}----------						
						---------(hR_f)---------						
TR-9 (191)		α,α,α-Trifluoro-toluene-3,4,5-triamine	10.5	5.2		0	0	0	14	1	21	--
						(0	0	0	13	1	19	--)
TR-10 (335)		α,α,α-Trifluoro-2'-hydroxyamino-6'-nitro-N-propyl-p-propionotoluidide		2.5?		0	0	0	48	0	36	--
						(0	0	0	45	0	34	--)
TR-11 (317)		2-Ethyl-7-nitro-1-propyl-5-(trifluoro-methyl)benzimidazole 3-oxide		2.5		0	0	0	0	0	22	--
						(0	0	0	0	0	20	--)

Table I. contd. 4.

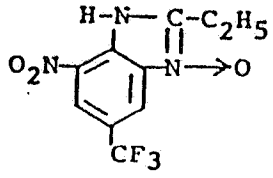
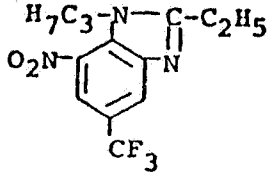
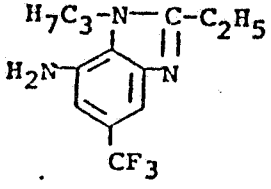
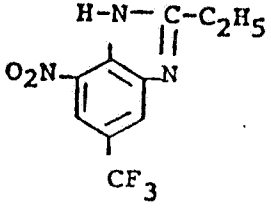
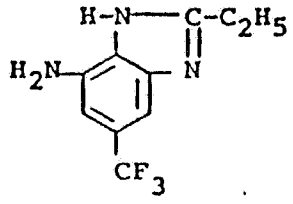
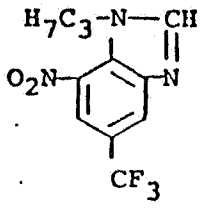
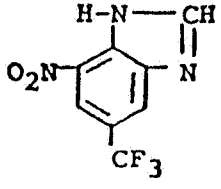
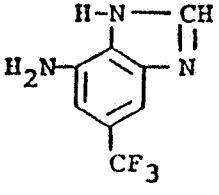
Compound (mol wt)	Structure	Name	glc-RT (min) 120°C (100°C)	glc-RT (min) 140°C (180°C)	hplc-RV (ml)	tlc solvent systems[d] 1	2	4	5	6	10	12
						hR_{TR}						
						(hR_f)						
TR-12 (275)		2-Ethyl-7-nitro-5-(trifluoromethyl)benzimidazole 3-oxide		5.4		0	0	0	4	0	20	--
						(0	0	0	4	0	18	--)
TR-13 (301)		2-Ethyl-7-nitro-1-propyl-5-(trifluoromethyl)-benzimidazole	6.7	3.0		7	12	34	71	19	88	--
						(5	10	28	66	17	82	--)
TR-14 (271)		7-Amino-2-ethyl-1-propyl-5-(trifluoromethyl)-benzimidazole		26.8		0	0	0	31	1	48	--
				(2.6)		(0	0	0	28	1	45	--)
TR-15 (259)		2-Ethyl-7-nitro-5-(trifluoromethyl)-benzimidazole	13.9	6.5		0	1	0	51	1	57	--
						(0	1	0	47	1	54	--)

Table I. contd. 5.

Compound (mol wt)	Structure	Name	glc-RT (min) 120°C (100°C)	glc-RT (min) 140°C (180°C)	hplc-RV (ml)	tlc solvent systems[d] 1	2	4	5	6	10	12
						---------- hR_{TR} ----------						
						---------- (hR_f) ----------						
TR-16 (229)		7-Amino-2-ethyl-5-(trifluoromethyl)-benzimidazole		35.0		0	0	0	7	0	26	--
				(3.6)		(0	0	0	6	0	24	--)
TR-17 (273)		7-Nitro-1-propyl-5-(trifluoromethyl)-benzimidazole	5.8			0	4	12	56	7	77	--
						(0	3	11	52	6	72	--)
TR-18 (231)		7-Nitro-5-(trifluoromethyl)-benzimidazole		4.6		0	0	1	24	0	30	--
						(0	0	1	22	0	27	--)
TR-19 (201)		7-Amino-5-(trifluoromethyl)-benzimidazole				0	0	0	5	0	15	--
				(3.0)		(0	0	0	4	0	13	--)

152****/******/7MANTIS/AM/****/497

Table I. contd. 6.

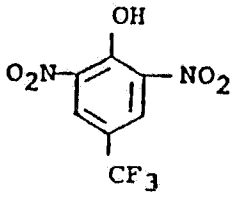
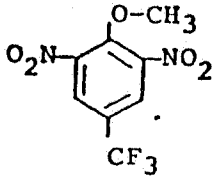
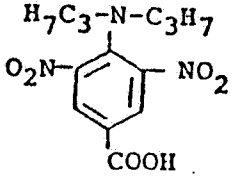
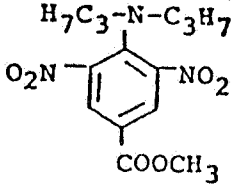
Compound (mol wt)	Structure	Name	glc-RT (min) 120°C (100°C)	glc-RT (min) 140°C (180°C)	hplc-RV (ml)	tlc solvent systems[d] 1	2	4	5	6	10	12
						----------hR_{TR}----------						
						---------(hR_f)----------						
TR-20 (252)		α,α,α-Trifluoro-2,6-dinitro-p-cresol				1	3	0	22	2	13	--
						(1	3	0	20	2	12	--)
TR-20M (266)		2,6-Dinitro-4-(trifluoromethyl)-anisole	(3.9)			71	92	69	99	93	97	--
						(58	82	63	92	84	91	--)
TR-21 (311)		4-(Dipropylamino)-3,5-dinitrobenzoic acid				0	0	1	6	0	11	--
						(0	0	1	5	0	10	--)
TR-21M (325)		Methyl 4-(dipropylamino)-3,5-dinitrobenzoate	14.0	6.8		26	58	90	98	68	98	--
						(21	52	83	92	61	92	--)

Table I. contd. 7.

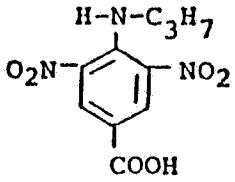
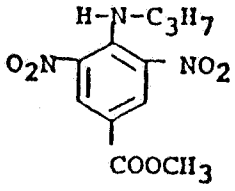
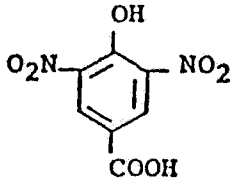
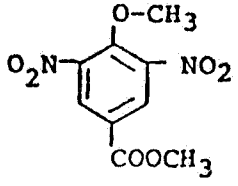
Compound (mol wt)	Structure	Name	glc-RT (min) 120°C (100°C)	glc-RT (min) 140°C (180°C)	hplc-RV (ml)	tlc solvent systems[d] 1	2	4	5	6	10	12
						----------hR_{TR}----------						
						---------(hR_f)---------						
TR-22 (269)		3,5-Dinitro-4-(propylamino)-benzoic acid				0	0	1	6	0	10	--
						(0	0	1	5	0	9	--)
TR-22M (283)		Methyl 4-(propylamino)-3,5-dinitrobenzoate		21.4		14	39	62	98	52	97	--
						(11	34	54	92	46	92	--)
TR-23 (228)		4-Hydroxy-3,5-dinitrobenzoic acid				0	0	0	0	0	0[e]	--
						(0	0	0	0	0	0	--)
TR-23M (256)		Methyl 3,5-dinitro-p-anisoate		5.7		13	39	43	95	54	96	--
						(10	34	38	89	48	91	--)

Table I. contd. 8.

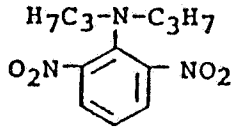
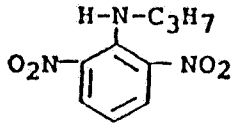
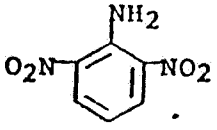
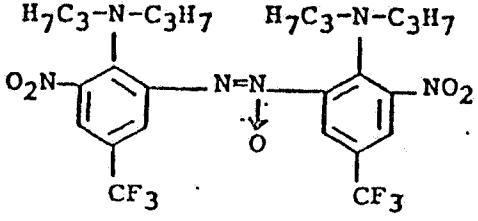
Compound (mol wt)	Structure	Name	glc-RT (min) 120°C (100°C)	glc-RT (min) 140°C (180°C)	hplc-RV (ml)	tlc solvent systems[d] 1	2	4	5	6	10	12
						----------hR_{TR}----------						
						---------(hR_f)----------						
TR-24 (267)		2,6-Dinitro-N,N-dipropylaniline		3.4		79	94	74	98	95	100	67
						(61	82	65	91	84	94	58)
TR-25 (225)		2,6-Dinitro-N-propylaniline		3.9		54	83	75	98	85	99	40
						(42	73	65	91	75	93	35)
TR-26 (184)		2,6-Dinitroaniline		2.4		29	61	43	98	66	97	--
						(22	54	37	90	58	91	--)
TR-27 (622)		2,2'-Azoxybis-(α,α,α-trifluoro-6-nitro-N,N-dipropyl-p-toluidine)			5	----------102----------						82
						(76	89	87	94	90	94	71

Table I. contd. 9.

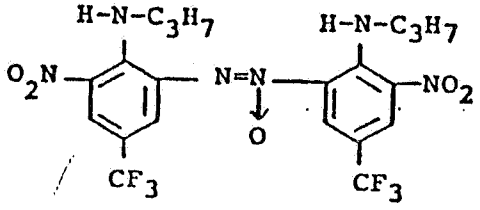
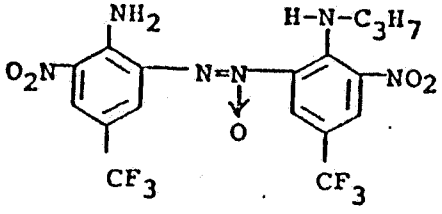
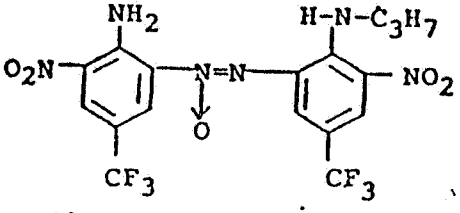
Compound (mol wt)	Structure	Name	glc-RT (min) 120°C (100°C)	glc-RT (min) 140°C (180°C)	hplc-RV (ml)	tlc solvent systems[d] 1	2	4	5	6	10	12
						----------hR_{TR}----------						
						---------(hR_f)----------						
TR-28 (538)		2,2'-Azoxybis-(α,α,α-trifluoro-6-nitro-N-propyl-p-toluidine)			12	57	91	78	100	95	100	27
						(44	80	63	93	83	93	23)
TR-29 (496)		N-propyl-2,2'-azoxybis(α,α,α-trifluoro-6-nitro-p-toluidine)			41	16	59	26	100	81	98	--
						(12	51	22	93	72	91	--)
TR-30 (496)		N'-propyl-2,2'-azoxybis(α,α,α-trifluoro-6-nitro-p-toluidine)			29	23	72	38	100	85	98	--
						(17	62	33	93	74	92	--)

Table I. contd. 10.

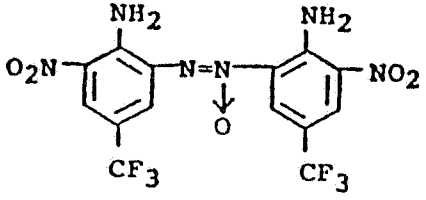
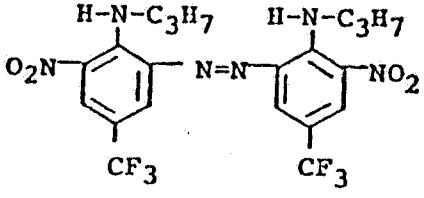
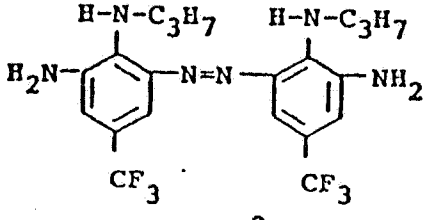
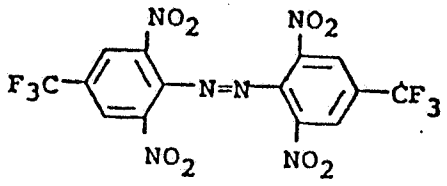
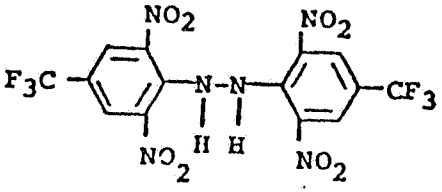
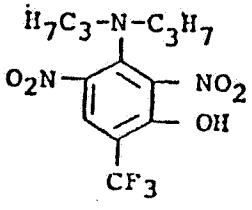
Compound (mol wt)	Structure	Name	glc-RT (min) 120°C (100°C)	glc-RT (min) 140°C (180°C)	hplc-RV (ml)	tlc solvent systems[d] 1	2	4	5	6	10	12
						----------hR_{TR}----------						
						---------(hR_f)---------						
TR-31 (454)		2,2'-Azoxybis-(α,α,α-trifluoro-6-nitro-p-toluidine)			47	6	39	6	99	61	97	--
						(5	34	5	92	53	90	--)
TR-32 (552)		2,2'-Azobis-(α,α,α-trifluoro-6-nitro-N-propyl-p-toluidine)			8	67	92	84	100	95	100	37
						(52	81	73	94	84	93	32)
TR-33 (462)		3,3'-Azobis-[N^2-propyl-6-(trifluoromethyl)-o-phenylenediamine]				1	5	5	63	9	53	--
						(1	4	4	58	8	50	--)

Table I. contd. //.

Compound (mol wt)	Structure	Name	glc-RT (min) 120°C (100°C)	glc-RT (min) 140°C (180°C)	hplc-RV (ml)	tlc solvent systems[d] 1	2	4	5	6	10	12
						----------hR_{TR}----------						
						---------(hR_f)---------						
TR-34 (498)		α,α,α,α',α',α'-Hexafluoro-2,2',6,6'-tetranitro-p,p'-azotoluene				27	88	0	100	88	98	--
						(20	75	0	92	76	90	--)
TR-35 (500)		1,2-Bis(α,α,α-trifluoro-2,6-dinitro-p-tolyl)-hydrazine				4	38	0	96	50	86	--
						(3	32	0	88	43	79	--)
TR-36 (351)		α,α,α-Trifluoro-4,6-dinitro-5-(dipropylamino)-o-cresol				2	2	0	19	3	3	--
						(1	2	0	17	3	3	--)

152****/******/ZMANTS/AM/****/500

Table I. cont'd. 12

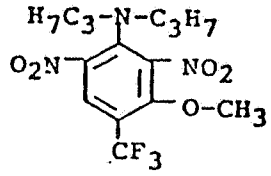
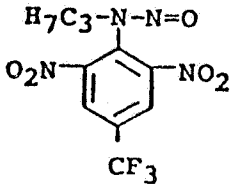
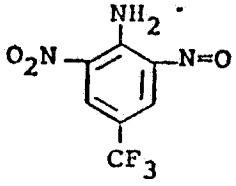
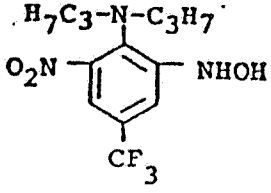
Compound (mol wt)	Structure	Name	glc-RT (min) 120°C (100°C)	glc-RT (min) 140°C (180°C)	hplc-RV (ml)	tlc solvent systems[d] 1	2	4	5	6	10	12
						----------hR_{TR}----------						
						---------(hR_f)----------						
TR-36M (365)		2,6-Dinitro-N,N-dipropyl-4-(trifluoromethyl)-m-anisidine		1.7		----------100----------						
						(74	86	84	92	87	92	--)
TR-37 (322)		α,α,α-Trifluoro-2,6-dinitro-N-nitroso-N-propyl-p-toluidine		2.1		44	82	39	99	86	97	--
						(32	70	32	90	74	89	--)
TR-38 (235)		α,α,α-Trifluoro-6-nitro-2-nitroso-p-toluidine	1.6			29	59	35	98	70	96	--
						(22	51	28	89	60	88	--)
TR-39 (321)		α,α,α-Trifluoro-2-hydroxyamino-6-nitro-N,N-dipropyl-p-toluidine	8.1	2.6		30	53	11	97	71	84	--
						(23	47	9	91	60	80	--)

Table I. contd. 13.

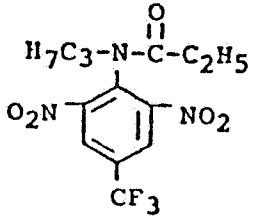
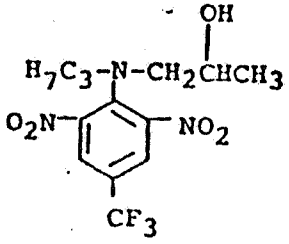
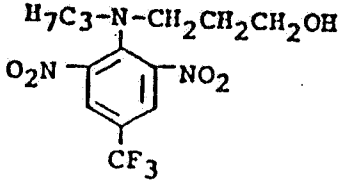
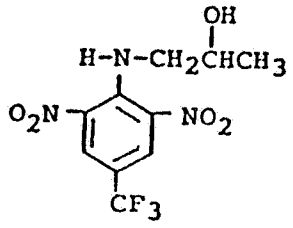
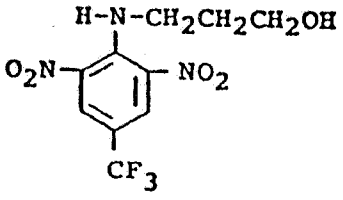
Compound (mol wt)	Structure	Name	glc-RT (min) 120°C (100°C)	glc-RT (min) 140°C (180°C)	hplc-RV (ml)	tlc solvent systems[d] 1	2	4	5	6	10	12
						hR$_{TR}$						
						(hR$_f$)						
TR-40 (349)		α,α,α-Trifluoro-2',6'-dinitro-N-propyl-p-propiono-toluidide		6.9		4	19	21	98	23	96	--
						(3	17	19	91	21	89	--)
TR-41 (351)		α,α,α-Trifluoro-2,6-dinitro-N-(propan-2-ol)-N-propyl-p-toluidine		5.0		9	19	24	96	28	92	--
						(7.	17	20	89	25	85	--)
TR-42 (351)		α,α,α-Trifluoro-2,6-dinitro-N-(propan-3-ol)-N-propyl-p-toluidine		8.8		2	6	4	83	10	65	--
						(2	5	3	78	9	60	--)

Table I. contd. 14.

Compound (mol wt)	Structure	Name	glc-RT (min) 120°C (100°C)	140°C (180°C)	hplc-RV (ml)	tlc solvent systems[d] 1	2	4	5	6	10	12
						----------hR_{TR}----------						
						----------(hR_f)----------						
TR-43 (309)		α,α,α-Trifluoro-2,6-dinitro-N-(propan-2-ol)-p-toluidine		(2.2)		2	7	3	91	12	69	--
						(2	6	2	85	10	64	--)
TR-44 (309)		α,α,α-Trifluoro-2,6-dinitro-N-(propan-3-ol)-p-toluidine		(3.1)		2	4	2	79	7	64	--
						(1	3	2	74	6	58	--)

[a] RT given for 1.5% XE-60 column 3 mm i.d. x 180 cm at indicated column temperature.

[b] Hplc conditions, see Methods.

[c] hR_{TR} = 100 x R_f relative to trifluralin, hR_f = 100 x R_f.

[d] Solvent system 12 was used with fast running tlc plates, all other solvent systems were used with silica gel tlc plates (see Methods).
Systems 1 - benzene-carbon tetrachloride (40:60)
2 - benzene
4 - n-hexane-methanol (97:3)
5 - benzene-ethyl acetate (60:40)
Systems 6 - benzene-1,2-dichloroethane (60:40)
10 - benzene-methanol (90:10)
12 - carbon tetrachloride

[e] TR-23 was mobile on tlc plate with solvent system 8 benzene-ethyl acetate-acetic acid (60:40:1), and 11 benzene-methanol (75:25).

4.0 CONCLUSIONS/RECOMMENDATIONS

4.1 The octanol/water coefficient of trifluralin is 118,000.

4.2 Trifluralin is stable to hydrolysis.

4.3 The rotational crop data supports the following rotational restriction:

Small grains may be planted 45 weeks after treatment and harvested at maturity, but the straw may not be used for food or feed. Corn may be planted 5 weeks after treatment and harvested at maturity, but the stalks may not be used for food or feed. Corn may be planted 1 year after application, harvested at maturity and used for food and feed. Root crops may be planted 50 weeks after application and harvested at maturity, but the tops may not be used for food or feed. Leafy vegetables may be planted 1 year after application, harvested at any time and used for food and feed. Tomatoes may be planted 1 year after application, harvested at any time and used for food and feed.

The above restrictions against feeding small grain straw, corn stalks and root crop tops may be lifted if the registrant can show the residues in these plant parts are either incorporated or that the residue is not composed of one or more identifiable constituents.

Norma Kay Metzel
January 15, 1984
Review Section No. 1
Environmental Fate Branch
Hazard Evaluation Division