

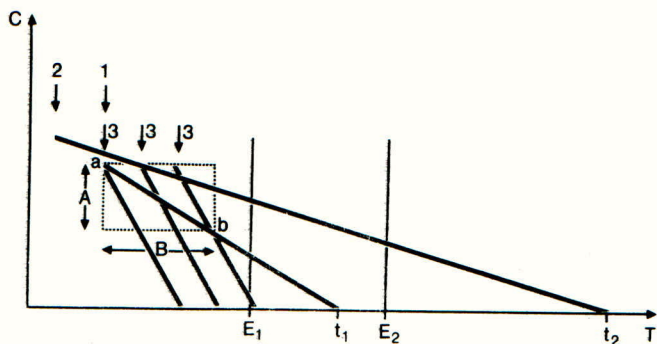


Figure 1. Change of pesticide concentration with time at various rates. (See text for explanation).

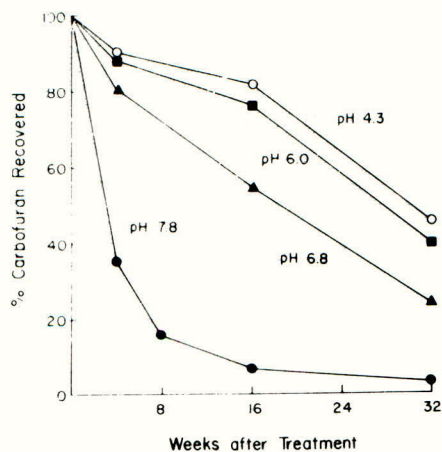


Figure 2. Degradation curves for carbofuran in Sultan silt loam at four pH levels (Getzin, 1973)

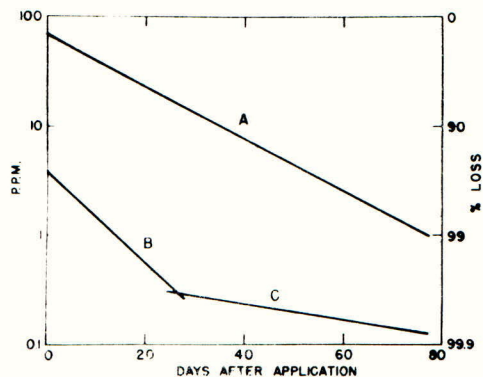


Figure 3. Illustration of degradation behavior (curves A and B) and persistence behavior (curve C). A, DDT on orange leaves; B-C, p-chlorophenyl-p-chlorobenzenesulfonate on orange fruit.

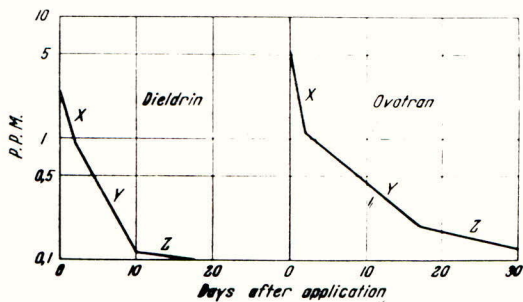


Figure 4. Curves showing the X, Y, and Z stages of the disappearance of dieldrin and Ovotran residues on citrus fruits (Gunther and Blinn 1955).

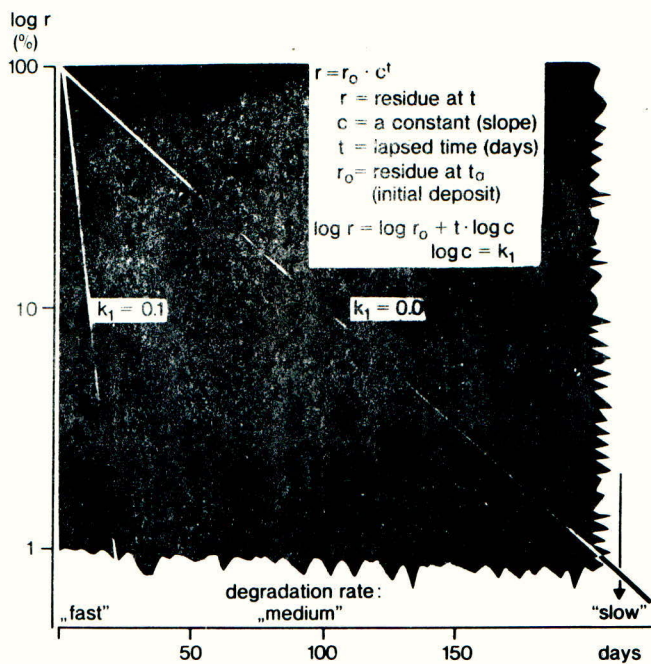


Figure 5. Exponential functions for decay rates.
(See text for explanation).

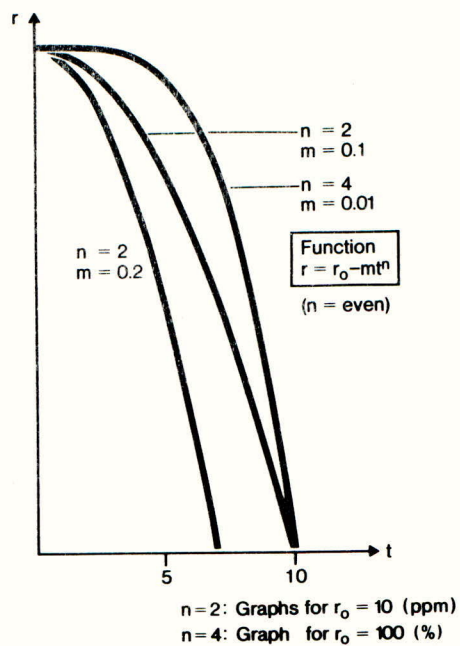


Figure 6. Parabolic functions representing degradation rates that increase slowly at first and then at faster rates.

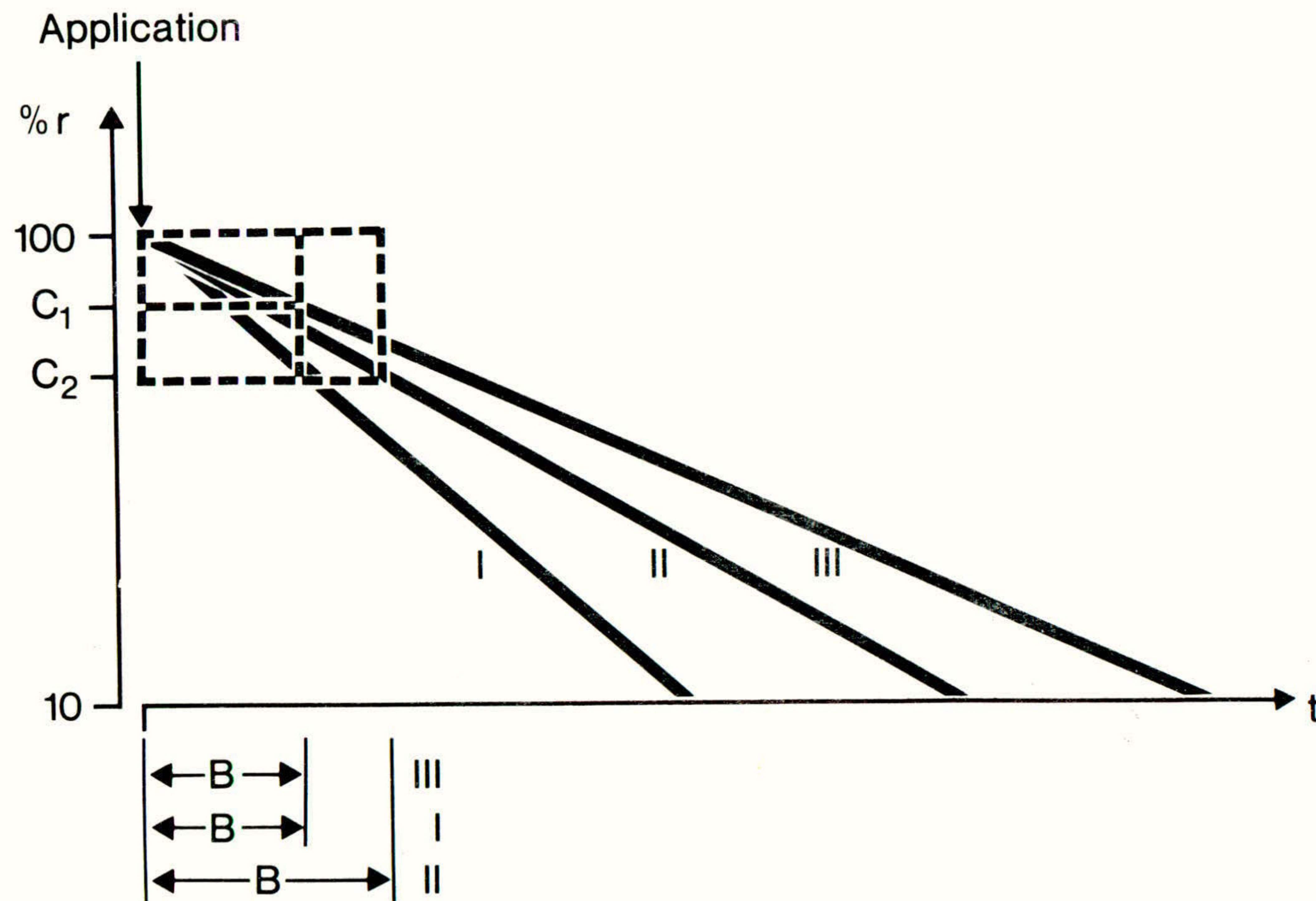


Figure 7. Pesticide degradation at various rates (I, II and III) related to the concentration and periods for control. (See text for explanation)

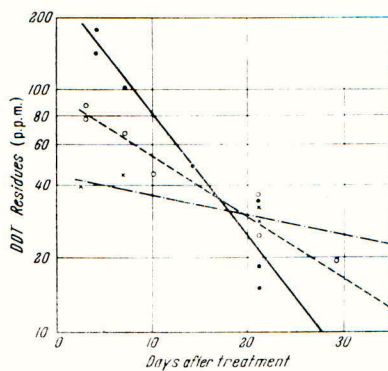


Figure 8. DDT residues on red clover treated at different stages of growth. Stage of crop when treated: ● -, 1 to 2 inches in height; o---, 5 to 6 inches in height; X---, 15 to 20 inches in height. (full bloom) (Decker 1975)

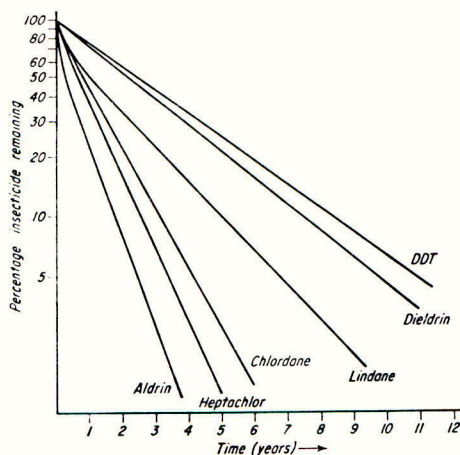


Figure 9. Breakdown of chlorinated hydrocarbon insecticides in soil. Regression based on all available data. (Edwards 1966)

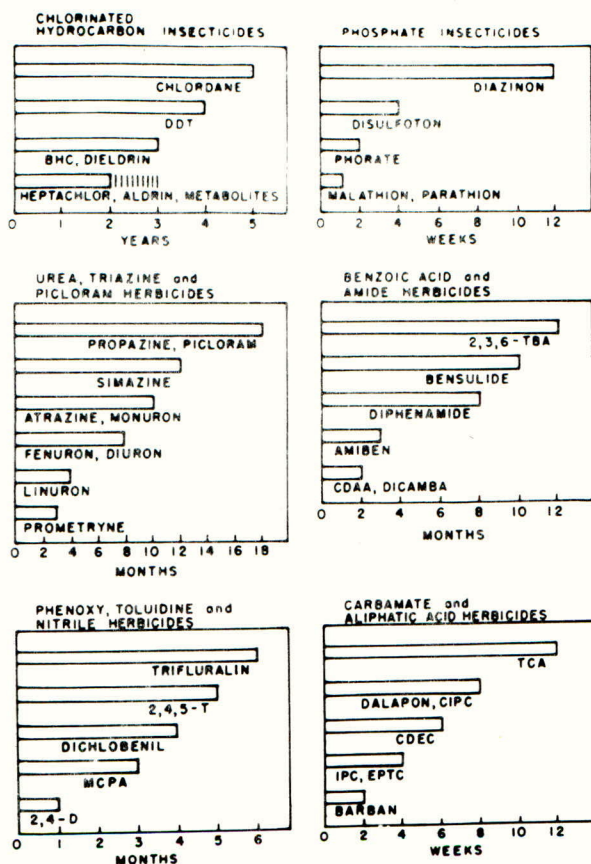


Figure 10. Persistence in soils of individual pesticides within a class. From M. W. Miller and G. G. Berg Chemical Fallout: Current Research on Persistent Pesticides, 1969 (Kearney, Nash & Isensee, 1969)

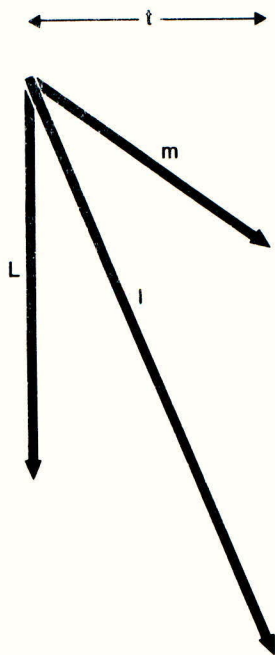


Figure 11. Vector diagram indication accompanying effects of leaching (L) and metabolism (m) in soil (See text for explanation).

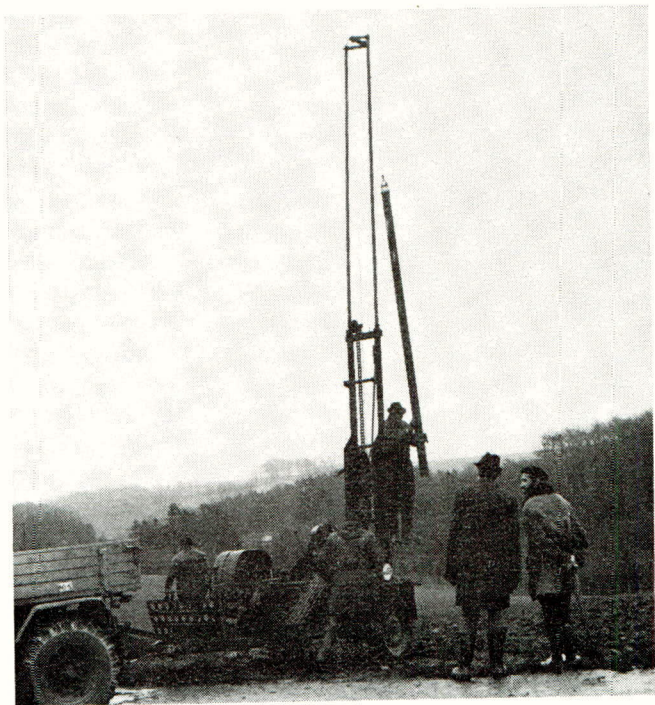


Figure 12. Corer used to take 'undisturbed' soil samples (10 cm diameter core)



Figure 13. Transfer of cores from sampler to glass columns.

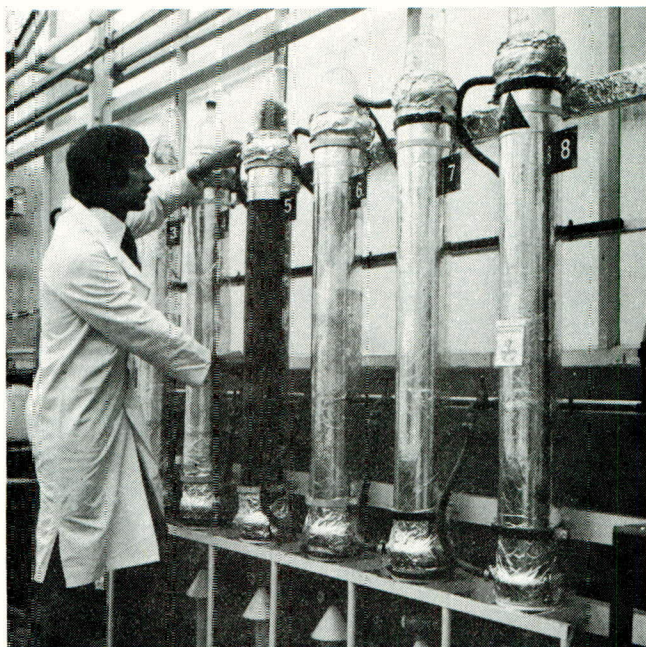


Figure 14. Columns containing the soil cores in the laboratory.

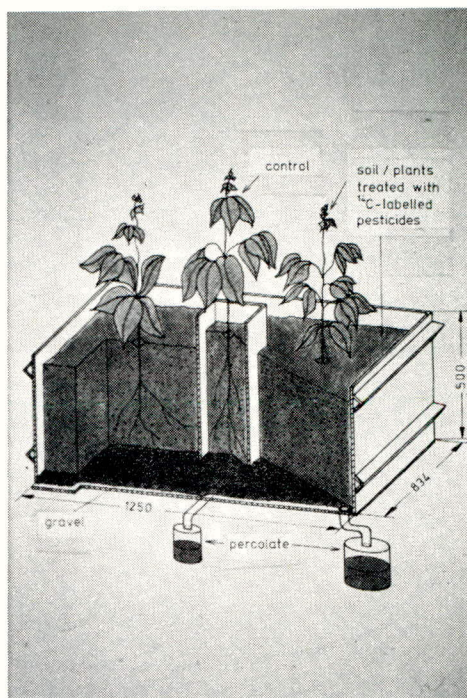


Figure 15. Lysimeter for field studies with plants and soils. (Dimensions are in mm)

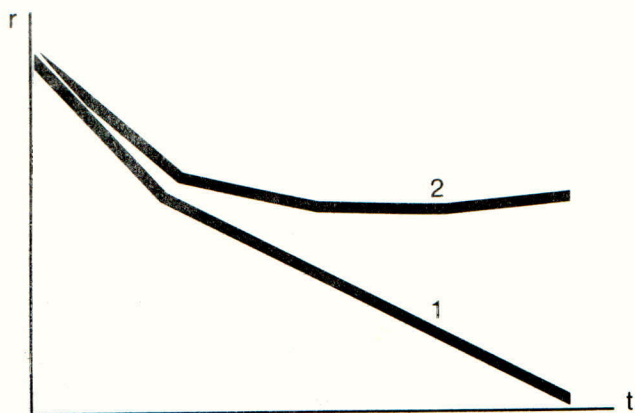


Figure 16. Degradation curves for two persistent pesticides.
(See text for explanation)

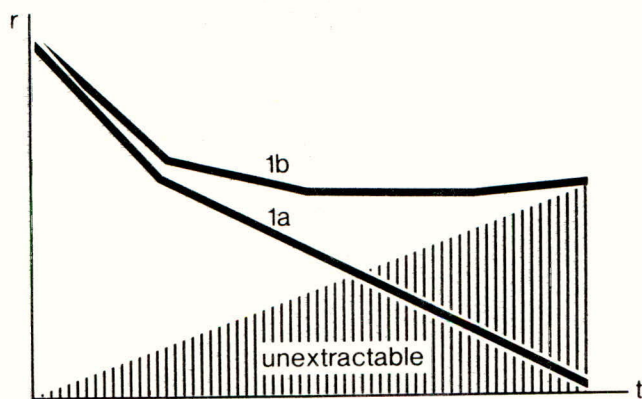


Figure 17. The added impact of unextractable residues on persistence. (See text for explanation)

Table 1

Example of collection of data on amounts and persistence of
insecticidal residues on plants

(Frehse 1964 ^a)

Chemical	Formulation	Dosage/acre	Crop	Stage	I. D. ^b	k_1^c	k_2^d	$t_{0.5}^e$	t_{tol}^f	Reference and location
Parathion	10% aerosol	1 g./1,000 ft. ³	Lettuce	Mature	3.8	15	—0.063	4.8	18	SMITH <i>et al.</i> 1954 (greenhouse plants)
	15% WP	1.5 lb./100 gal. (1½ gal./tree)	Peach Bark	7 years old (early fruit)	290	225 µg./cm. ²	—0.0187	16		BONS 1954 (Virginia)
		4.5 lb./100 gal. (1½ gal./tree)			265	240 µg./cm. ²	—0.0244	12		
		0.83	Peaches	Immature	0.5 (1 day)	0.57	—0.06	5		BRAID and DUSTAN 1955 (Ontario)
		1.66			1.17 (2 days)	1.6				
	46.12% EC	2 lb./100 gal.		Green	147	147 µg./fruit	—0.06	5		BRUNSON and KORLITSKY 1952 (New Jersey)
				Ripe	0.6 (7 days)	23	—0.05	5	6	
				10 days	1.85	2.05	—0.08	4	4	
					1.89	2.0	—0.08	4	3	
	46.7% EC					3.0	—0.20 (0—3 days)	1.5	2+	FAHEY <i>et al.</i> 1952 (S. Indiana)
	15% WP	1.5 lb./100 gal.		Ripe	3.0	0.9	—0.044 (3—36 days)	6.8		
		2 lb./100 gal.			4.3	3.8	—0.044		13	(N. Ohio)
	25% WP	0.2 lb./100 gal.		21 days	0.7	0.75	—0.08	4		USDA, July 9, 1959 (New Jersey)
		0.4 lb./100 gal.			1.9	1.4	—0.07	4	2	

^a From HOSKINS 1961^b I. D. = initial deposit, p.p.m.^c Extrapolated deposit for zero time, p.p.m.^d Slope of time — log residue line.^e Half-life, days.^f Days to achieve tolerance value.

Table 2 Residue Decay Values for Alfalfa or Grass

(Compiled and calculated from data by
Hoskins 1961)

Compound	k_1		Mean t_{50} (half-life) days*
	range	mean (geometrical)	
Azinphos	0.08 - 0.5 (7)	0.279	1.1
Aldrin	0.04 - 0.6 (10)	0.131	2.3
Malathion	0.07 - 0.20 (5)	0.125	2.4
Parathion	0.08 - 0.18 (4)	0.122	2.5
Dieldrin	0.02 - 0.133 (8)	0.068	4.4
Lindane	0.022 - 0.10 (10)	0.051	5.8
Heptachlor	0.009 - 0.02 (21)	0.045	6.7
Endrin	0.031 - 0.05 (5)	0.040	7.5
Toxaphen	0.006 - 0.68 (26)	0.038	7.9
DDT	0.023 - 0.076 (6)	0.035	8.6
Endosulfan	0 - 0.33 (6)	<0.03	>10
Chlordane	0.006 - 0.018 (4)	0.013	23

() number of values

*calculated from
mean k_1

Table 3 See text for explanation

Threshold concentration	P.E.T. ₉₀	P.E.T. ₉₅	P.E.T. ₉₉
70%	6.5 B	8.4 B	13 B
60%	4.5 B	5.9 B	9 B
50%	3.3 B	4.3 B	6.6 B
40%	2.5 B	3.3 B	5 B
30%	1.9 B	2.5 B	3.8 B

Table 4

Quotients calculated from unpublished data

(Bayer AG)

Compound	Fungicide	Herbicide	Insecticide
Fuberidazole	0,03		
Isofenphos			0,6
Metribuzin		0,7	
Tolylfluanid	0,9		
Trichloronate			1,2
Methamidophos			1,9
Sulfodiazole		2,3	
Parathion			2,8
Triadimefon	3,8		
Ethiofencarb			5,4
Fluotrimazole	30		

„Acceleration Quotients” (q_s) for Soils

$$q_s = \frac{t_{90} \text{ laboratory}}{t_{90} \text{ field}}$$

(t_{90} = time required for 90% “disappearance”)

Table 5

Quotients calculated from unpublished data

(CHEMAGRO, USA)

Compound	Phosphate	Carbamate	Other
Trichlorphon	2		
Methiocarb		3	
Fensulfothion	≈ 3		
Edifenphos	≈ 3,3		
Fenamiphos	>5		
Azinphos	8		
Quinomethionate			14
Oxydemeton-methyl	18		
Metribuzin			≈ 50
Propoxur		60	
Disulfoton	100		

„Acceleration Quotients” (q_w) for Water

$$q_w = \frac{t_{50} \text{ in buffer}}{t_{50} \text{ outdoors}}$$

(t_{50} = “half-life”)

Table 6

Comparative environmental behavior of pesticides in soil

(Haque a. Freed, 1974)

Compound	Vaporization ¹ index (from soil)	Leaching ² index
<i>Herbicides</i>		
Alachlor	3.0	1.0-2.0
Propanil	2.0	1.0-2.0
Trifluralin	2.0	1.0-2.0
Dalsapon-Na	1.0	4.0
MCPA (acid)	1.0	2.0
2,4-D (acid)	1.0	2.0
2,4,5-T (acid)	1.0	2.0
<i>Insecticides</i>		
Carbaryl	3.0-4.0	2.0
Malathion	2.0	2.0-3.0
Naled	4.0	3.0
Dimethoate	2.0	2.0-3.0
Fenthion	2.0	2.0
Diazinon	3.0	2.0
Ethion	1.0-2.0	1.0-2.0
Oxydemeton-methyl	3.0	3.0-4.0
Azinophosmethyl	—	1.0-2.0
Phosphamidon	2.0-3.0	3.0-4.0
Mevinphos	3.0-4.0	3.0-4.0
Methyl parathion	4.0	2.0
Parathion	3.0	2.0
L/DT	1.0	1.0
BHC	3.0	1.0
Chlordane	2.0	1.0
Heptachlor	3.0	1.0
Toxaphene	4.0	1.0
Aldrin	1.0	1.0
Dieldrin	1.0	1.0
Endrin	1.0	1.0
<i>Fungicides</i>		
Captan	2.0	1.0
Benomyl	3.0	2.0-3.0
Zineb	1.0	2.0
Maneb	1.0	2.0
Mancoseb	1.0	1.0