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Background Report Reference

AP-42 Section Number: 9.2.2

Background Chapter: 4

Reference Number: 5

Title: " The Disappearance of Dimethoate from Soil" in Journal of Economic Entomology

W.R. Bohn

1964

Table 1.—General summary of leaf-cutting ant colonies treated with 5% heptachlor dust.

Colony number	Area in m²	Dosage 20 g/m²	Dosage 30 g/m²	Canals treated	Results (after 6 months)
1	41	×		14	Dead
2	13	×		4	Dead
3	24	×		8	Alive
4	26	×		9	Dead
5	127	×		42	Dead
6	9	×		3	Dead
7	25		×	9	Dead
8	16		×	5	Dead
9	12		×	4	Dead
10	65		×	22	Dead
11	14	×		5	Alive
12	15		×	5	Dead
13	60		×	20	Dead
14	18		×	6	Alive
15	49	×		16	Alive
16	31	×		10	Dead
17	56	×		19	Dead
18	39		×	13	Dead
19	60		×	20	Dead
20	80		×	27	Dead

indicated that 16 colonies appeared to be dead, 2 suspected extinct, and 2 alive.

Excavation.—On 10 November 1962, 177 days after treatment, all ant nests were opened. The excavation consisted of manual cutting of a trench from 50 to 80 cm wide and 1.2 to 1.7 m deep across the original apparent center of the colony. Digging was done by

Table 2.—Consolidated summary of 5% heptachlor dust for leaf-cutting ant control.

Dosage	No. of colonies	Avg area per colony (m²)	Total area (m²)	Avg no. canals treated	Total canals treated	Colonies [illegible]	[illegible]
20 g/m²	10	39	390	13	130	7	[illegible]
30 g/m²	10	39	390	13	131	9	[illegible]
Total	20		780		261	16	[illegible]

experienced rural laborers. As the underground [illegible] gus chambers were uncovered, they were examined [illegible] determine if they were empty, or contained any [illegible] or dead material. By this criterion, of the 20 exp[illegible] mental colonies 16 were killed—7 (or 70%) by the [illegible] dosage and 9 (or 90%) by the higher dosage. Tab[illegible] gives the results obtained for each ant hill. Tab[illegible] summarizes these experimental findings.

CONCLUSIONS.—The experiment demonstrates [illegible] 5% heptachlor dust can produce excellent re[illegible] The dosage should be made at the rate of 30 g/[illegible] applied on the basis of 3 m² of loose raised soil.

Recommended conditions for successful control [illegible] clude: (a) dry soil to allow the dust to [illegible] canals to the necessary depth, a[illegible] cation and exposure of the pr[illegible] day of treatment.

AP-42 Section 9.2.2
Reference
Report Sect. 4
Reference 5

REFERENCE C[illegible]

Goncalves, A. 1962. O heptachl[illegible] limao." FIR, Sao Paulo 4 (9)

The Disappearance of Dimethoate from Soil[1]

W. R. BOHN

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ABSTRACT

Dimethoate (Cygon®) decomposition was studied following the application (1 lb actual per acre) of an emulsifiable concentrate to a cultivated sandy loam soil. Half of the insecticide in the top 3 in. of soil disappeared in 4 days in drought conditions and in 2.5 days after moderate rainfall. Rate of disappearance did not change with repeat applications and rainfall did not cause appreciable leaching into the 3–6 in. zone.

Dimethoate (Cygon®) insecticide is now recommended for control of leafminers, lygus bugs, aphids, and leaf hoppers on potatoes, tomatoes, watermelons, cotton, safflower, and peas. It is anticipated that in the future its use will be equally applicable to other crops. Since repeat applications are used, it is possible that many crops may receive several applications during a single season. It is important, therefore, to know its accumulation and persistence in soil.

A soil study was developed at American Cyanamid's Agricultural Center in Princeton, New Jersey, on a sandy loam soil to follow the migration and rate of disappearance of dimethoate following spray application. A plot, 48×50 ft, was cultivated to a depth of 6 in. and dimethoate applied at a rate of 1 [illegible] active ingredient per acre. This was accomplished [illegible] a spray bar with no. 55 nozzles pressurized [illegible] over 50–60 gal per acre at a height of 23–24 in., [illegible] an overlap of 1–2 in. at ground level.

Samples were taken immediately after application and at the intervals indicated in Table 1. [illegible] sampling representing the inner 80% of the p[illegible] was carried out using a soil-sampling bar with a 1-in. core. Duplicate samples for each of 2 depths, 0–6 in. and 0–3 in., were taken and immediately analyzed [illegible] dimethoate and moisture content. At the end of 1 week, the plot was divided and ½ of the plot was again treated with dimethoate at a rate of 1 lb per acre. The dimethoate content was followed on both portions of the plot for the next 7 days. Then that portion which had received 2 applications was treated for a third time with dimethoate at 1 lb per acre, and both sections were sampled and analyzed at regular

[1] This manuscript was endorsed and communicated by D. L. Goleman. Received June 29, 1964; accepted for publication August 25, 1964. Cost of printing this paper was paid by the American Cyanamid Company, Agriculture Division, Princeton, N. J.

Table 1.—Summary of results on dimethoate in soil[a] following application as a spray.

Days after last application	Ppm dimethoate following: 1 application of 1 lb dimethoate/acre		2 applications of 1 lb dimethoate/acre at 7-day intervals		3 applications of 1 lb dimethoate/acre at 7-day intervals	
	0–3 in.[b]	0–6 in.	0–3 in.	0–6 in.	0–3 in.	0–6 in.
0	1.1	0.42	1.08	0.51	1.7	1.0
1	0.61	.46	—	—	—	—
2	.79	.46	0.72	0.29	1.1	0.42
4	.40	.32	.39	.19	0.61	.30
7	.40	.16	.54	.30	.18	.08
9	.21	.11	—	—	—	—
10	—	—	—	—	0.09	<0.05
14	0.07	<0.05	—	—	—	—

[a] Soil analysis: 75% Sassafras sandy loam; 15% Delanco sandy loam; 10% Woodstown sandy loam; pH, 5.5; moisture holding capacity, 13%.
[b] Sampling depth.

intervals until the insecticide level had dropped below the sensitivity of the method.

The dimethoate content was determined by the colorimetric method of George et al. (1962) and the moisture content using a Brabender moisture teller.

An average recovery of 75% dimethoate from fortified soil was obtained over the range of 0.05 to 2.0 ppm; apparent dimethoate in the untreated soil was less than 0.05 ppm.

Favorable weather conditions enabled us to follow the disappearance of dimethoate in the absence of rainfall and again after a moderate rainfall. The air temperature during the study was average for the season with a high of 87°, a low of 54°, and a mean temperature of 72°.

The results of the study as summarized in Table 1 and graphically presented in Fig. 1 show that dimethoate, when applied at rates exceeding the present recommendation to a sandy loam soil, disappears rapidly.

The biological half-life of dimethoate in this soil during drought conditions is approximately 4 days. Where moderate rainfall occurs following application, the disappearance of dimethoate is more rapid, with a biological half-life of 2½ days. The data also show that dimethoate does not migrate beyond 3 in. from the surface of the soil following multiple applications of the insecticide under the conditions of the experiment.

REFERENCE CITED

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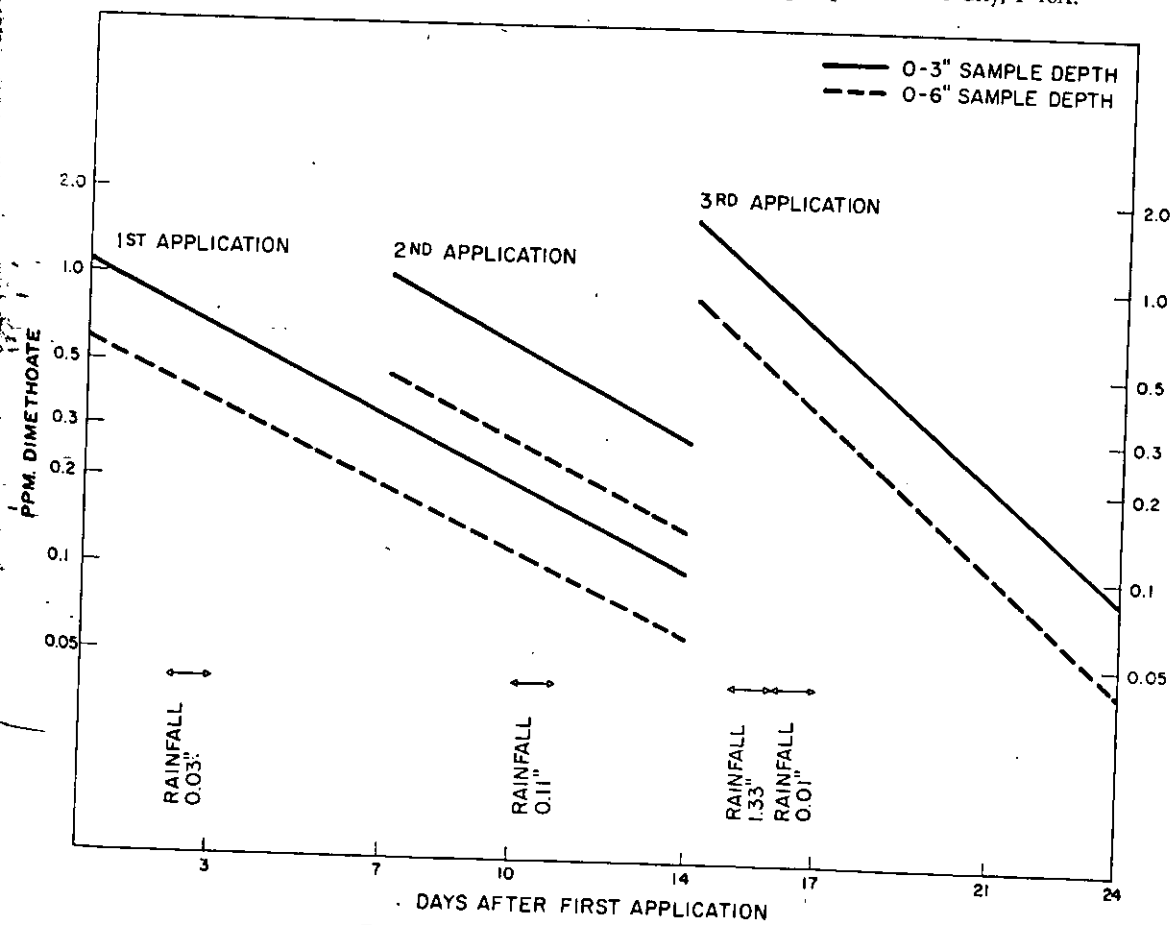

FIG. 1.—Disappearance of dimethoate in soil.