# Dihydrochlordene Dicarboxylic Acid Residues in Soil Treated With High Rates of Aldrin

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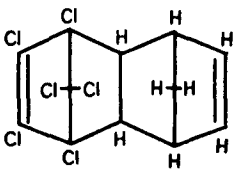
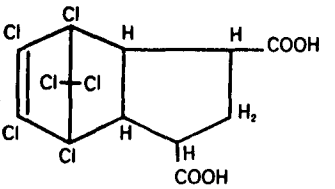
It has recently been observed (WEISGERBER *et al.* 1974) that after application of $^{14}C$-labelled aldrin, I, to soil under simulated field conditions the principal hydrophilic metabolite was dihydrochlordene dicarboxylic acid, II, (1,2,3,4,8,8-hexachloro-1,4,4a,6,7,7a-hexahydro-1,4-endo-methylene-indene-5,7-dicarboxylic acid).




I




II

The present study reports residues of II, determined by gas chromatography, in soil samples at intervals of up to 14 years after large amounts of aldrin had been applied.

## MATERIALS AND METHODS

Aldrin was incorporated to the 15 cm depth into a sandy loam soil at two rates (5.6 & 11.2 kg/ha/yr) for 3 successive years (STEWART *et al.* 1965). Various crops were grown, and soil samples were collected at intervals for 14 years, air-dried, and stored at 1°C. The climate was humid temperate - mean annual temperature 6.4°C, mean annual precipitation 106 cm.

Residues of II were extracted by shaking a 10.0 g soil sample with 100 ml 1% $K_2CO_3$ for 1 hr, centrifuging, acidifying the solution and extracting residues of II into methylene chloride. The residues were esterified with diazomethane in ether-methanol and determined on a Micro Tek 200 gas chromatograph fitted with a Ni-63 electron capture detector. The analytical column was 122 x 0.64 cm Pyrex packed with 3% Silar 10C

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on Gas Chrom Q, 100/120 mesh. At an oven temperature of 210°C and a carrier gas (argon - 5% $CH_4$) flow of 75 cc/min the retention time of II dimethyl ester was 13 min. A 3% OV-225 column was used for confirmation. The primary standard used was II dimethyl ester prepared according to RIEMSCHNEIDER & KIRSTEIN (1960).

## RESULTS AND DISCUSSION

Residues of II, found in all aldrin-treated soil samples (Table 1), increased with depth whereas aldrin

TABLE 1

Dihydrochlordene dicarboxylic acid soil residues (ppm)

| Years after initial application | Depth sampled (cm) | 5.6 kg/ha/yr rate | 11.2 kg/ha/yr rate |
|---|---|---|---|
| 5 | 0-15 | 0.56 ± .10 | 0.88 ± .12 |
| 6 | 0-15 | 0.32 ± .04 | 0.81 ± .17 |
| 8 | 0-15 | 0.37 ± .09 | 0.52 ± .07 |
| 9 | 0-7.5 | 0.31 | 0.48 |
| | 7.5-15 | 0.58 | 0.57 |
| | 15-22.5 | 0.32 | 0.67 |
| | 22.5-30 | 0.42 | 0.85 |
| 10 | 0-7.5 | 0.17 | 0.16 |
| | 7.5-15 | 0.21 | 0.48 |
| | 15-22.5 | 0.36 | 0.66 |
| 14 | 0-7.5 | 0.08 | 0.19 |
| | 7.5-15 | 0.16 | 0.18 |
| | 15-22.5 | 0.26 | 0.43 |

Years 5,6,8 - Mean of 5 replicates with standard error
Years 9,10,14 - Composite samples of 5 replicates

and dieldrin residues were negligible below 15 cm. In the 10th year after initial application of aldrin, residues of aldrin and dieldrin in the 0-15 cm depth were 0.2 and 1.7 ppm respectively. Residues of II at each depth decreased with time probably due to both leaching and decomposition. It appears that dihydrochlordene dicarboxylic acid must be considered a significant terminal residue of aldrin in soil.

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