HEM 030501 2-Methyl-4-chlorophenoxyacetic acid

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ORMULATION 00 - ACTIVE INGREDIENT

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elling, C.S.; Turner, B.C. (1968) Pesticide mobility: determination by soil thin-layer chromatography. Science 162(3853):562-563.

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CONCLUSIONS:

Mobility - Leaching

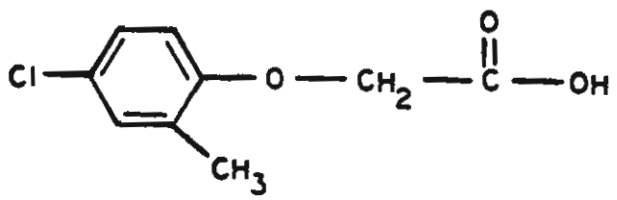
1. This study is scientifically valid.

2. MCPA was compared to other pesticides and was considerably more mobile in the soils studied. MCPA was found to leach to the greatest extent in the soil with the lowest level of organic matter (R_f 1.00) and was least mobile in the soil with the highest organic matter (R_f 0.62).

3. The data from this study help fulfill the data requirements pertaining to leaching in Section 163.62-9(b) of EPA's Proposed Guidelines for Registering Pesticides (July 1978) by providing information on the leaching of MCPA in sandy loam, silt loam, and silty clay loam soils.

MATERIALS AND METHODS:

MCPA, AGRITOX, AGROXONE, CORNOX-M, DIKOTEX, HEDONAL-M, KILSEM, KREZONE, LINORMONE, MCP, MEPHANAC, METAXON, RAPHONE, RHOMENC, RHOMENE, RHONOX, TRASAN, WEEDAR, ZELAN



2-Methyl-4-chlorophenoxyacetic acid.

Three soils (Table 1) from the A_p horizon (a layer 0-6 inches in cultivated soil) were prepared and then spread onto conventional thin-layer chromatography (TLC) plates. In the preparation process, medium sand (>250 µm) was removed by dry sieving from the Chillum and Hagerstown soils, and coarse sand (>500 µm) was removed by dry sieving from the Lakeland soil. Soil-water slurries were then prepared. A variable thickness spreader was used to spread a 500-µm layer of the Chillum and Hagerstown soils. A glass rod was used to spread a 750-µm layer of Lakeland soil. Several pesticides, including [^{14}C]MCPA (purity, activity, and rate not given), were individually applied to the TLC plates and developed 10 cm with water by ascending chromatography. The plates were visualized by autoradiography and frontal R_f values were determined.

To compare the results of the different pesticides, the authors developed a classification system using the Hagerstown soil data. Class 1 (least mobile) = R_f 0-0.09; Class 2 = R_f 0.10-0.34; Class 3 = R_f 0.35-0.64; Class 4 = R_f 0.65-0.89; Class 5 = R_f 0.90-1.00.

REPORTED RESULTS:

MCPA was most mobile in the soil with the lowest level of organic matter and least mobile in the soil with the highest level of organic matter (Table 1). In the authors' proposed classification scheme, with an R_f of 0.78 in the Hagerstown soil, MCPA was considered to have a Class 4 rating. Compared with trifluralin, which had a Class 1 R_f of 0.00, in the Hagerstown soil, and Dicamba, which had a Class 5 R_f of 0.96 in the same soil, MCPA was relatively mobile.

DISCUSSION:

1. This study was well conceived and described. The methods used appear to present a useful tool for comparison of pesticide mobilities. The study was weakened somewhat because the pH of the soils was not reported. Soil acidity or alkalinity may affect pesticide leaching, and the addition of an acidic pesticide such as MCPA may decrease the pH of the soil.

2. Larger (greater than 0.25 or 0.5 mm) sand particles were sieved from the soils prior to slurry preparation for soil TLC. Although this may alter the integrity of the soil it is necessary to assure a TLC plate of uniform thickness. It is also unlikely that large practically inert particles would significantly affect a physical phenomenon such as leaching. A direct comparison of soil TLC with soil column leaching studies is necessary to determine the effects of sand removal and a thin soil layer on MCPA mobility via leaching.

Table 1. Mobility of MCPA as determined by soil TLC.

Soil	Clay (%)	Organic matter (%)	R_f
Lakeland sandy loam	12.0	0.9	1.00
Chillum silt loam	26.3	3.1	0.62
Hagerstown silty clay loam	39.5	2.5	0.78