US EPA ARCHIVE DOCUMENT

UNDATED

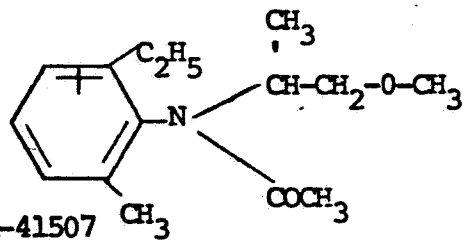
TOPICAL - SUMMARY

Soil Metabolism 162.62-8 b and c

PROPRIETARY

The minimal data requirement for terrestrial uses is a study on a sandy loam, loam, silt loam or other textured soil appropriate to intended application sites. Adequate accounting of chemical transformations of residues comprising more than ten percent is needed and a material balance, including nonextractable residues, must be provided. The study should cover a period of 12 months or until 90% loss of parent pesticides occurs, whichever comes first and until patterns of formation and decline of metabolic products are established. Supplementary laboratory anaerobic metabolism studies are needed on aged soil (1 month old) from the abovementioned aerobic study.

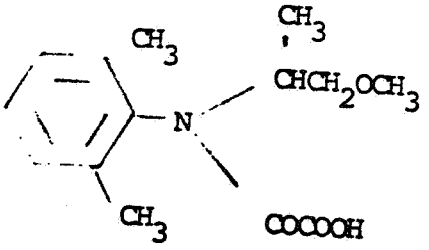
Elleghausen, 1976b studied the degradation of metoachlor in soil under sterile and non-sterile conditions. Also, he studied decomposition under aerobic-non sterile followed by anaerobic non sterile conditions. Under sterile conditions, at the end of 12 weeks, 30% of (I) the reductively dechlorinated analog of metachlor was found. No other metabolite could be detected, the remaining radioactivity existing as undergraded metolachlor.



(I) CGA-41507

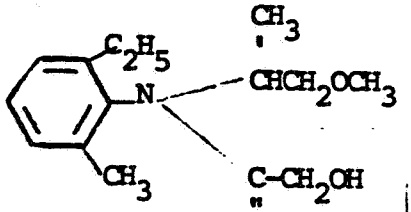
Such a finding is totally unexpected under the stated aerobic conditions of the test. At a similar time interval of 12 weeks, both the aerobic/non-sterile and aged aerobic/anaerobic non-sterile studies resulted in a degradation pattern wherein about 18% of the radioactivity was identified as (II).

PROPRIETARY

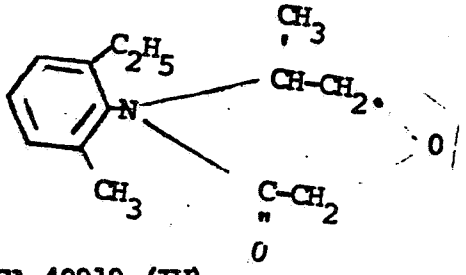


(II) CGA - 51202

Another 10% of the initially applied radioactivity was found as polar, water soluble products, inseparable by thin layer chromatography, but could be methylated with diazomethane to form three distinct components, separable by GLC. The registrant considers these to be ring hydroxylated analogs of II. A $CHCl_2$-soluble non-polar metabolite, representing about 5% of initial radioactivity was compared, by TLC and GLC co-chromatography to 26 model metolachlor metabolites with no identity fit. Small amounts of (I) and other unidentifiable polar and non-polar extractables were also found. Sumner et. al., 1976 studied the products of degradation of ring labeled ^{14}C-metolachlor in silt loam soil treated at an exaggerated rate (100 ppm) and incubated out-of-doors in open bottomed containers. Besides 41.7% of total initial radioactivity found as metolachlor <u>per se</u>, 0.9% of III and 0.1% IV were found.



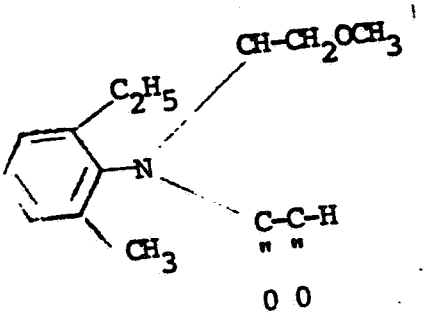
CGA-40172 (III)



CGA-40919 (IV)

Additionally, an oxalic acid derivative was tentatively identified (V).

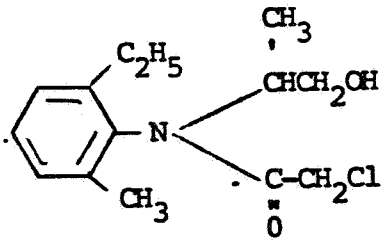
(V)



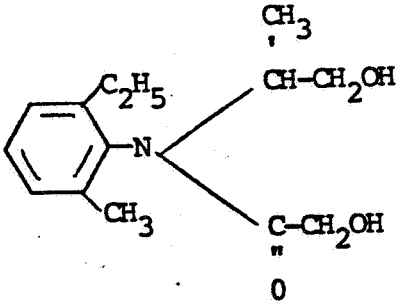
PROPRIETARY

Chemicals contained in the leachate from this study were qualitatively similar, as determined by comparative radioassay of various TLC R_f zones.

Concurrently, Sumner et. al., 1976 conducted a field plot study of silt loam soil treated at 2 lbs/acre and aged 12 months. This study yielded in addition to III, IV and V the additional compounds VI and VII.



(VI) CGA-41638



(VII) CGA-47194

All metabolites in both substudies were less than 1% of total radioactivity except (III) in the leachate which represented 2.5% of total radioactivity. Two TLC spots, representing metabolites less polar than VI were also noted, both at the 1 percent level, in the extracts from the field experiment as well as a spot near the TLC plate origin representing 6.4% of the total radioactivity.

Evidence is provided by Sumner and Cassidy 1974 that non-extractable bound residues of metolachlor and its metabolites are in dynamic equillibrium with soluble forms and that the non-extractable portion may therefore serve as a long term reservior for extractable residues.

Sumner and Cassidy, 1975 showed that under field conditions, over a 1 year period, the relative percentage of unextractable residues reaches a steady state (ca. 80% of total). During the latter stages of the test, the relative amount of extractable residue in the organic fulvic and humic acid fractions decreased with a concomitant increase in the amount remaining in H_2O soluble and mineral fractions. The fractionation procedure used was described by Sumner 1974.

PROPRIETARY

The following additional studies contain information related to metabolic transformation in soil:

Analytical Biochemistry Laboratories, Inc. 1974; Dupre, G.D., 1974a; Sumner and Cassidy, 1974g; 1974k, 1974l, 1974m, 1974f, 1974e.

In all of the abovementioned studies using ^{14}C-radiolabeled metolachlor, only the uniformly ring labeled synthesate was used. It should be noted that metabolic transformations of N-alkyl side chains (e.g., the fate of the monochloroacetic acid moiety) has not been elucidated.

When viewed as a composite, the above described tests are considered sufficient to meet the requirements for registration provided that additional rotational crop studies are completed which give a more definitive picture of the nature of residues taken up from soil.