

US EPA ARCHIVE DOCUMENT

PROPRIETARY

DISCIPLINARY SUMMARY

General Assessment - Environmental Fate

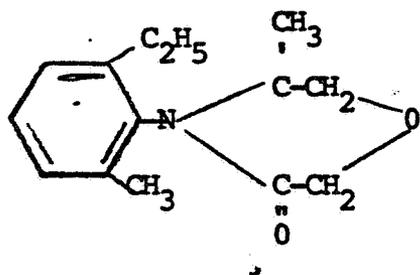
Burkhard, (1974) in a laboratory study demonstrated that metolachlor is quite stable to hydrolysis over the environmental pH range of 5 to 9.  $t_{1/2}$  for metolachlor is 200 days over this entire pH range.

Houseworth (1973) in a laboratory column leaching study, using a wide range of soil types, showed that metolachlor per se is subject to extensive leaching when applied to soils having low organic content. Extensive leaching can be expected in soils such as agricultural sands and sandy loams having organic contents of 2% or less. Skipper et. al. (1976) in field tests designed to show field dissipation of metolachlor concluded that extensive leaching was the major cause of dissipation from the upper 3 inch soil horizon in two different plots containing sandy loam soils. Residues of aged  $^{14}C$  metolachlor were also found to leach extensively in sandy loam soil (Dupre, 1974). Based on incremental  $^{14}C$  activity at different soil depths several discrete chemicals of different mobilities were probably involved.

A runoff study by Dupre, 1974 showed that metolachlor can be expected to move from agricultural sites of application both by sheet erosion and leaching. Quantitative comparisons with other pesticides, however, were not provided.

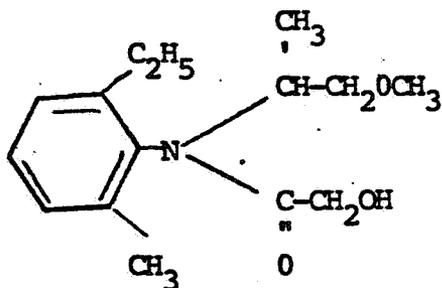
Aziz and Kahrs (1974) studied the photolysis of metolachlor in aqueous solutions under conditions of natural sunlight over a period of one month. Only 6.6% loss due to photolysis occurred.

A total of at least 4 other unidentified products were also found. About 30% of the photoproducts represented (I) and (II). Another 30% was represented by  $\text{CHCl}_3$  and water soluble polar metabolites. Indirect evidence obtained from analysis of aqueous photoproducts produced by artificial light of  $< 280 \text{ nm}$ . suggests that the polar products, both aqueous soluble and  $\text{CHCl}_3$  soluble, are not aldehydes or phenolic in nature (Aziz and Kahrs, 1975). Exposure of  $^{14}\text{C}$  metolachlor treated soil thin layers to natural sunlight (Aziz, 1974) resulted in gradual photolysis to (III) and three unidentified products two having moderate polarity and one relatively high in polarity. After 8 days exposure about 1/2 of the initially applied dose had decomposed.



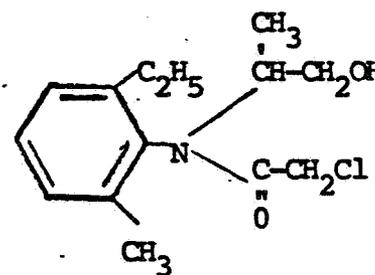
(I)

CGA-40919



(II)

CGA-40172



(III)

CGA-41638

N-propen-ol-2-yl-N-chloroacet-  
2-methyl-6-ethylaniline



example, in a Nebraska study, residues declined only 44% over a 107 day time span. In some cases, substantial residues were found in the 6" - 12" soil horizon suggesting extensive leaching.

Based on the relatively slow hydrolysis of metolachlor between pH 5 and 9 and the rapidity of degradation in certain of the soil degradation studies, it can be concluded that the action of microbes on the pesticide probably is an important mode of degradation. Aerobic and anaerobic degradations appear to lead to similar metabolites (Elleghausen 1976b).

A diverse selection of soil microorganisms were evaluated against 3 concentrations of metolachlor, 5, 25 and 150 ppm. Only static not tidal effects were noted (Ercegovich, Bogus and Buly, 1978). Another study using the same concentrations showed no effects on nitrification at the two lower levels and only temporary inhibition at the high level (Ercegovich, Vallejo and Bogus, 1978).

Bluegill sunfish exposed for 70 days to a mean level of 1.2 ppm  $^{14}\text{C}$  metolachlor accumulated 18 ppm of  $^{14}\text{C}$  activity expressed as metolachlor in their edible tissues and 486 in non-edible tissues. After a 28 day depuration the respective residue levels decreased to 10 and 10 ppm respectively. The chemical nature of the residues was not investigated (Bionomics, 1974).

A catfish study (Cannon Labs, 1977) involving aged metolachlor on sandy loam soil sediments, resulted in an accumulation of 0.72 ppm in edible catfish tissue at the end of 30 days exposure. After 14 days of depuration the level decreased to .03 ppm. Respective values for viscera at the end of the 30 day exposure and after 14 days depuration were 92.4

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and .18 ppm respectively. The major identified metabolites found in the edible tissues was OGA-46576.

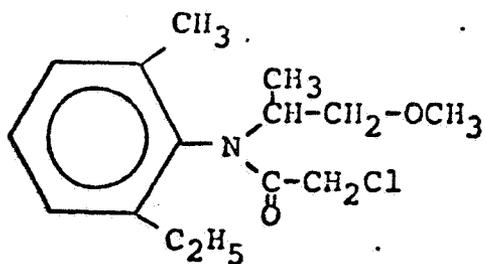
Average level of  $^{14}\text{C}$  metolachlor in the water was 0.08 ppm. Three unidentified degradation products were also found in the water.

Roots of root crops, grain of small grains and oil from oil seed crops grown as rotational crops to corn were shown to have little, if any, residues of metabolites as analyzed by the officially accepted regulatory method for corn grain, forage and fodder (Balasubramanian et. al., 1975). This method will detect metolachlor per se and a series of sugar and glutathione conjugates which can form after hydrolysis of the N-alkyl groups of metolachlor to terminal OH groups.  $^{14}\text{C}$  studies on rotational crops to corn, however, gave evidence of other possible metabolites which if present in a rotational crop would not be detected by the official regulatory method for corn products. Also, the following types of rotational corn products were found to contain finite residues in one or more samples collected for analysis by the method of Balasubramanian et. al., 1975: carrot tops, soybean stalks, sugar beet tops, wheat straw.

From Marco, 1974

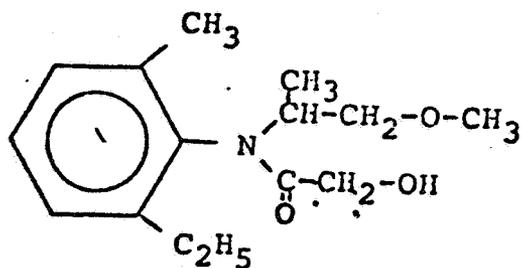
FIGURE 1: CHEMICAL NOMENCLATURE, STRUCTURES AND POSITION OF 14C LABEL FOR CGA-24705 AND ITS METABOLITES

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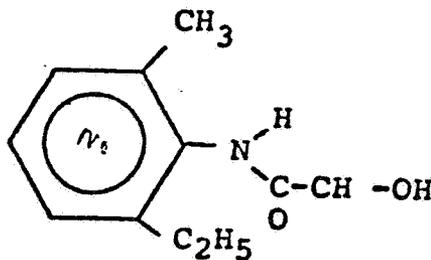


2-Chloro-N-(2-ethyl-6-methylphenyl)-N-(2-methoxy-1-methylethyl) acetamide

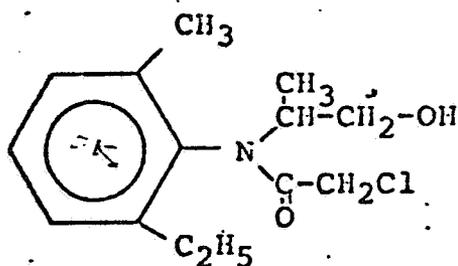
CGA-24705  
Compound A



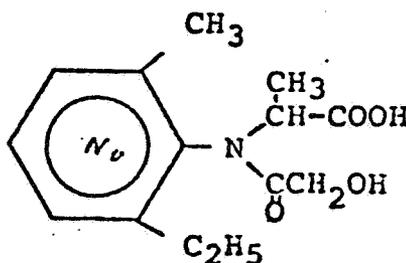
CGA-40172  
Compound B



CGA-37735  
Compound C



CGA-41638  
Compound D

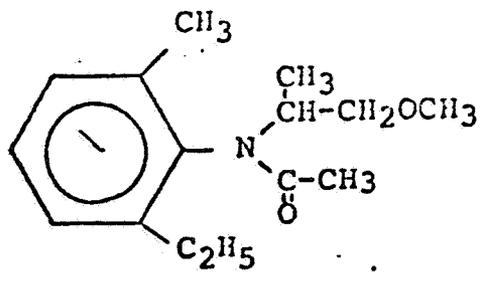


CGA-46129  
Compound E

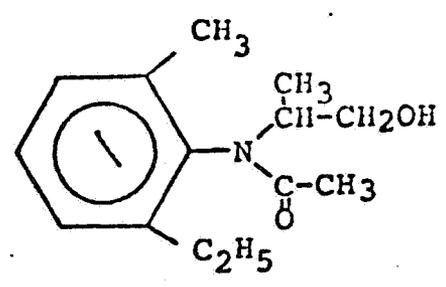
Fig. I,  
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From Marco, 1974

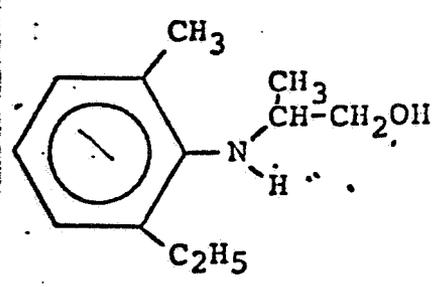
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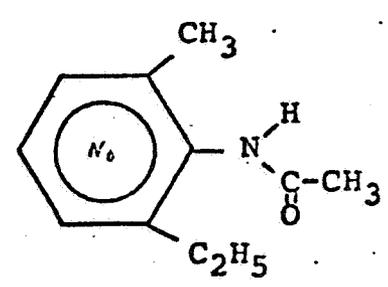
CGA-41507  
Compound F



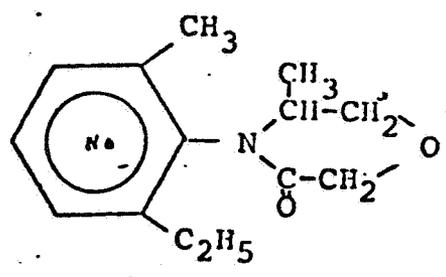
CGA-42446  
Compound G



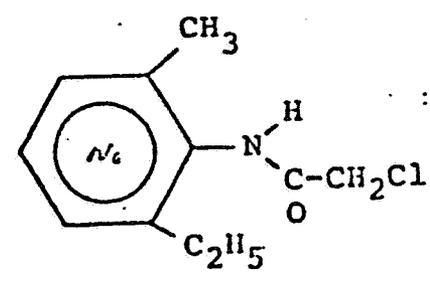
CGA-37913  
Compound H



CGA-42444  
Compound I



CGA-40919  
Compound J



CGA-13656  
Compound K

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From Maeco, 1974

TABLE IV: Ionic Characterization of Radioactive Metabolites  
in Polar Fraction of Corn Treated with 2 lb a.i./A  
 $\text{C}^{14}$ -CGA-24705

<u>Location</u>	<u>Ionic Charge</u>	<u>Percent of Total <math>^{14}\text{C}</math> in Plant</u>		
		<u>8</u>	<u>12</u>	<u>16 (mature forage)</u>
Greenhouse	Neutral	7.0	7.9	a
	Acid	73.1	53.6	a
	Base	0.6	0.9	a
	Zwitterion	6.2	21.4	a
Field	Neutral	7.4	10.8	7.3
	Acid	68.2	70.4	26.3
	Base	1.7	1.2	1.0
	Zwitterion	2.7	8.4	15.3

a) Sample decomposed in shipment