US EPA ARCHIVE DOCUMENT

UNDATED

TOPICAL - SUMMARY

PROPRIETARY

Rotational Crop (Section 162.62-11 b)

The minimum data requirement is a laboratory or greenhouse study using a sandy loam soil treated with radiolabeled pesticide at a rate equivalent to that expected under actual use conditions using representative root, small grain and leafy vegetable crops. When residues are found in any of the above studies, a field study using formulated products is needed to determine if residues occur under actual use conditions.

Oats, carrots, and soybeans were grown as rotational crops to corn 9 months after soil treatment at 2 lbs/acre using $^{14}C$-ring labeled metolachlor.

Low levels of residues ranging from .02 to .27 ppm, expressed as metolachlor, were found in different portions of the various crops (Sumner and Cassidy, 1974e, Sumner and Cassidy, 1974f, Sumner and Cassidy 1974g).

The preponderant extractable residues were polar in nature (partition into $H_2O$/MeOH vs. $CHCl_3$) and the two major fractions constituting these polar residues were neutral and acidic nature, as determined by ion exchange chromatography. A typical analysis of such plant residues is provided by the following example for oat straw derived from oats grown as a rotational crop to corn where metolachlor was applied at a rate of 2 lbs/acre (Sumner and Cassidy, 1974f).

| | | Calculated ppm as Metolachlor |
|---|---|---|
| 1. Total $^{14}C$ activity | = 0.27 ppm | |
| 2. $H_2O$/MeOH extractable, % of total activity | = 67% | .18 |
| a. Neutral Fraction, % of total activity | = 19% | .05 |
| b. Acidic Fraction, % of total activity | = 45% | .19 |
| 3. $CHCl_3$ extractable, % of total activity | = 7.0% | .02 |

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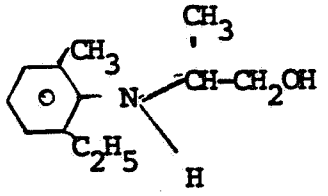
Based on a review by Marco, 1974 of metabolism studies with metolachlor in corn, one is led to the conclusion that only highly polar acid metabolites, such as conjugates involving the N-alkyl and/or the N-acetyl group of metolachlor are present. However, close inspection of actual data (Table IV of Marco, 1974) shows that the relative amounts of polar neutral and polar acidic constitutents in extracts of mature stalks differ only by about 4 to 1 and therefore it is difficult to understand why the investigators were not able to obtain TLC characterization of the polar neutral constitutents (C.F. Sumner and Cassidy, 1974e; Sumner and Cassidy, 1974).

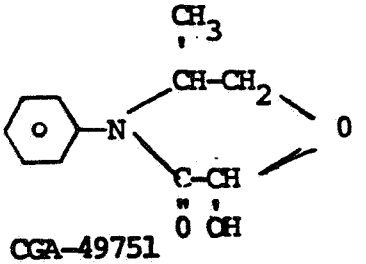
Marco, 1975 and Sumner and Cassidy 1975 argue that the metabolic pathways in rotational carrots and soybeans are qualitatively similar based on comparison of the ionic and TLC comparative characteristics of acidic constitutents.

While it is conceded the conjugated metabolites of metolchlor in corn grain may be the only ones worthy of consideration, the same is not necessarily true with rotational crop uptake. Compounds unable to readily form sugar and/or S-glutathione conjugates may be taken up by rotational crops and exist discrete residues. In turn, these are worthy of individual consideration by the toxicologist.

Also, it should be noted that the official regulatory method for metolachor and its metabolites in corn is based on an acid hydrolysis which forms I and II, (Balasubramanian et. al., 1975).




(I) CGA-37913




(II) CGA-49751

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This method will not detect compound C,E,I,J or K (See Fig. I) all of which are postulated degradation products of metolachlor (Marco, 1974) and none of which can readily form conjugates. Again, using the oat (straw) example, cited above, one can conclude that the entire neutral fraction of the $H_2O$/MeOH extractables equalling 0.05 ppm could be a mixture of compounds C,E,I,J and K (or other degradates of a similar nature) and would not be detectable by the method of Balasubramanian et. al., 1975) Such compounds should be readily amendable to GLC and TLC separation $R_f$ zone and retention time comparisons with model compounds.

Based on information submitted by the registrant (Ciba Geigy: AG-A 3150, I and II; AG-A 3244, II; AGA 3283 (I), 2nd Report AG-A 3283; AG-A 35554 (II) the roots of root crops, grain of small grains and oil from oil seed crops can reasonably be expected to contain little, if any, residue of metolachlor per se or its metabolites hydrolyzable to I or II using the method of Balasubramanian et al., 1975.

All residues analyses for (I) were .03 ppm or less and for (II) 0.01 ppm or less. The question as to whether this regulatory method for corn related products is applicable to rotational crops is moot and must await further elucidation of the nature of the neutral polar metabolites in rotational crops.

The studies cited above show that levels of metolachlor derived residues in other plant portions of the above mentioned crops (carrot tops, soybean stalks, sugar beet tops and wheat straw) may at times be expected to exceed this analytical "baseline" level when grown as rotational crops to corn and analyzed by the pro-

cedure of Balasubramanian et al, 1975.

Three specific data deficienies appear to exist:

a. Data are not available on residues in leafy vegetable, rotational crops.

b. Insufficient explanation has been provided as to why the neutral extractable polar and $CHCl_3$ extractable non-polar matabolites were not identified in rotational crops.

c. Since all $^{14}C$ studies were run using ring labeled metolachlor, information relating to the possible existence of monochloracetalyhehyde residues in plant tissues is not available for evaluation.

On the basis, of the above labelling restrictions with regard to the planting of rotational crops will be necessary.