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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR 12 1991

OFFICE OF
PESTICIDES AND TOXIC
SUBSTANCES

MEMORANDUM:

SUBJECT: ID #029-001. 1,3-Dichloropropene [TELONE®-II]: Proposed protocols for plant metabolism studies on soybeans and tomatoes grown in sandy loam and in clay loam soils.[DEB:#7285;MRID: n/a].

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TO: Herman T. Toma, Review manage
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Special Review and Reregistration Division (H7509c)

DowElanco, Midland,MI has submitted four protocols of plant metabolism studies for 1,3-Dichloropropene [TELONE®-II] in/on soybeans and in/on tomatoes as required by the TELONE® Registration Standard, 9/30/90. Protocols, were provided for two "Probe" [soil] studies and two primary [field] metabolism studies designed to determine the effect of soil type/texture on TELONE® uptake residues in the tissues of plants grown in treated soil.

Background: The Registration Standard for 1,3-Dichloropropene required a study of the metabolism and distribution of the material in plants grown in treated soils. In response Dow Chemical did submit protocols for these required studies for DEB's approval. However, in our review of 11/5/86 [D. Edwards], additions and modifications to the protocols were suggested in order to conform to the Reregistration Standard.

The registrants re-analysis of the 1987 tissues from the original soybean and lettuce/spinach plant metabolism studies, in response to the Registration Standard of 1986, were unacceptable and a new plant metabolism study was recommended. [Memo: G. Otakie, 12/21/89]. In our 12/21/89 memo, DEB concluded that residue data were needed on the distribution and metabolism of [^{14}C]-1,3-Dichloropropene (including 1,2-Dichloropropene) in/on soybeans and tomatoes grown in both sandy loam and clay loam soils. In DEB's conference with the registrant on 4/18/90 this requirement was modified so that the studies need only be done in that soil retaining higher ^{14}C-residues, thereby permitting two rather than four metabolism studies.

In response, the registrants have attached protocols which include: (A) "Probe" studies on the two soils using uniformly labelled [^{14}C]-1,3-Dichloropropene and (B) Field studies to determine the nature of the residues in soybeans and tomatoes plants following treatment of soils with [^{14}C]-1,3-Dichloro-propene.

PROPOSED PROBE AND FIELD STUDIES

In the (A)"Probe" and (B) Field studies, early growth tissue samples and mature tissue samples will be taken in an attempt to demonstrate the presence or absence of parent and/or recognizable metabolites of the parent in the plant tissue.

(A)"Probe" Studies and the Nature of the Residues in Soybeans and Tomatoes.

From the literature, it has been shown that volatilization, not degradation or leaching, is the major route of dissipation for 1,3-Dichloropropene from soil, with moisture and soil temperature being important factors on their dissipation and decomposition rates.

Regulatory Compliance: This study will be conducted according to the requirements of Section 171-(a)(1) & (2), Subdivision O, Residue chemistry, 1982, and FIFRA Good Laboratory Practice Standards, 40 CFR Part 160.

Objective: The objective of these studies is to determine the level of ^{14}C-residues taken up by the soybean and tomato plants following the pre-plant application of the uniformly labelled isotope of 1,3-dichloropropene in both sandy loam and clay loam soils.

Procedure: Two stainless steel boxes (30 x 61 x 38 cm) each filled with different soil will serve as the test plots. The labelled [^{14}C]-1,3-Dichloropropene will be injected about 30 cm (twelve inches) below the surface of the soil using a syringe and

needle. Applications will be made approximately every 5 cm (about two inches) each injected with 220 uL of the solution. [Note: In terms of weight, the amount injected would correspond to 305 mg soil per 220 uL]; also see Appendix A for schematic drawing of the plot]. Immediately following each injection, the top 5 to 8 cm of the soil will be disturbed by hand cultivation then tampered down. Two zero time samples will be taken, one immediately before and one immediately after the soil treatment. Each sample will be assayed for activity by combustion/LSC analysis, according to Plant Fate Group SOP-4p. The treatment will be equivalent to approximately 170g (140 L) ai/ha.

Storage Stability

Representative control plants with [^{14}C]-1,3-Dichloropropene or [^{14}C]-Chloroallyl alcohol, will be collected and processed the same as the treated plants. These will be stored and analyzed for activity under the same conditions as the treated tissue samples.

Characterization of ^{14}C-Residues

The primary goal of this study is to determine total residues in the plants based on soil type. If sufficient plant material is collected, preliminary metabolite profiles will be examined by HPLC.

(B) Field Studies: Nature of the Residues in Soybeans and Tomatoes following the Pre-Plant Application of Cis- and Trans-[^{14}C]-1,3-Dichloropropene.

Regulatory Compliance: Same as was shown above under "Probe" studies.

Objective: To determine the nature of the [^{14}C]-1,3-dichloropropene residues in soybean and tomato plants following the pre-plant soil application of [^{14}C]-1,3-Dichloropropene.

Procedure: The type or soil to be selected will be based on the results obtained from the "Probe" study on the nature of the residues in soybeans and tomato plants. Except for the following differences, the approach toward the proposed field studies will be similar to the "Probe" studies:
The crops are to be planted between the rows of chemical applications. Two 180 cm (6 ft) rows about 30 cm (1 ft) apart will be treated with [^{14}C]-1,3-Dichloropropene at the rate of 23 g/row. The fumigant will be injected about 30 cm (1 ft) below the surface of the soil using a needle and syringe. Application will

be made at approximately every 10 cm (4 in) with a 1.0 ml injection. Applications with start and end on each row with a total of 19 injections. Analysis for total ^{14}C-residues of the soil and plant specimens will be again determined by combustion/ LSC analysis according to SOP-4b.

Storage Stability

Same as was noted above under "Probe" studies for soybeans and tomatoes.

Isolation, Characterization, and/or Identification of ^{14}C-Residues.

Specimens with an average ^{14}C-residue content of 0.01 ppm of 1,3-Dichloropropene equivalents, or greater, will be analyzed for the parent compound and/or metabolites. When resolution of the residues into their components is necessary, appropriate solvent extraction and chromatographic procedures will be used for their isolation and concentration. A suggested extraction/chromatographic outline (developed from previous work on soybean tissue) is presented in Appendix B. The degree of residue characterization will follow the guidelines set forth in R.D. Schmitt's, CB/HED/OPP, July, 1989 Memorandum entitled, "Guidance on When and How to Conduct Livestock Metabolism Studies". Methods of analysis will be validated using ^{14}C-labelled, 1,3-Dichloropropene spiked control tissue samples.

CONCLUSIONS

(1) In response to DEB's review of 12/21/89, data on the distribution and metabolism of [^{14}C]-1,3-Dichloropropene (including ^{14}C-Chloroallyl alcohol) in/on soybeans and tomatoes grown in both sandy loam and clay loam soils were required. In reply, the registrants have submitted proposed protocols which will include "Probe" or soil studies and field studies on potential residues in plant tissues grown in [^{14}C]-1,3-Dichloropropene treated soil.

(2) The submitted protocols conform to the our recommendations.

RECOMMENDATIONS

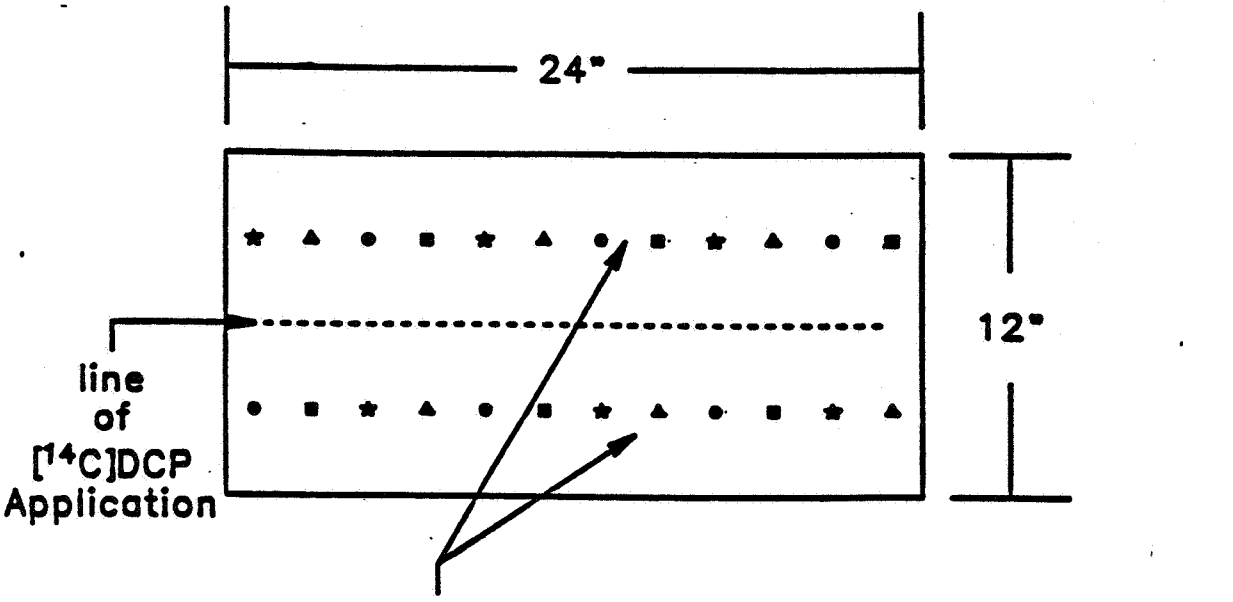
The registrant should be informed that their metabolism protocols appear to conform to our recommendations.

Attachment: Appendix A & B.
CC: RF;SF[1,3-Dichloropropene,TELONE®-II];Circulation;Reviewer; FOD/PIB(C.Furlow).
RDI: FBS;SN,3/7/91;EZ,3/7/91.
H7509C: WLA;wla;CM-2;Rm.812c;X557-4351;3/11/91.

A

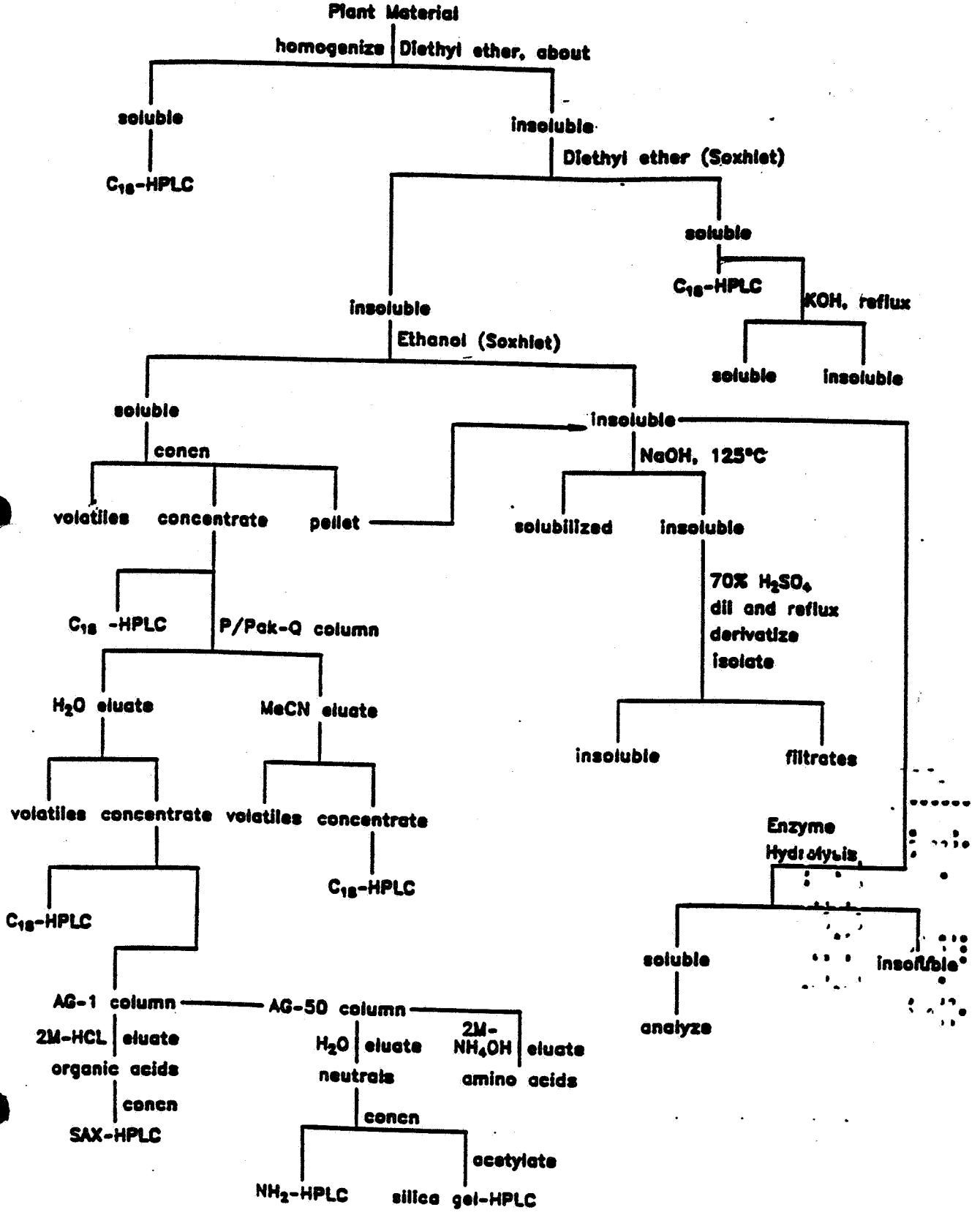
APPENDIX

TEST PLOT



planting lanes
- starting 1 inch in from side
- each plant separated by 2 inches
- each lane 3 inches from injection line

APPENDIX


Plant Material
homogenize
Diethyl ether, about
soluble
C_{18}-HPLC
insoluble
Diethyl ether (Soxhlet)
soluble
C_{18}-HPLC
KOH, reflux
soluble
insoluble
insoluble
Ethanol (Soxhlet)
soluble
conen
volatiles
concentrate
pellet
insoluble
NaOH, 125°C
solubilized
insoluble
70% H_2SO_4
dil and reflux
derivatize
isolate
C_{18} -HPLC
P/Pak-Q column
H_2O eluate
MeCN eluate
insoluble
filtrates
volatiles
concentrate
volatiles
concentrate
C_{18}-HPLC
Enzyme
Hydrolysis
C_{18}-HPLC
soluble
insoluble
analyze
AG-1 column
AG-50 column
2M-HCL
eluate
organic acids
H_2O
eluate
neutrals
2M-
NH_4OH
eluate
amino acids
conen
SAX-HPLC
conen
acetylate
NH_2-HPLC
silica gel-HPLC