

TIMSC030

DATA EVALUATION RECORD

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CASE GS0014

ENDOSULFAN STUDY 42

EM-11C 08/12/79

CFEM 079401

Endosulfan

BRANCH EEP DISC 30 TCFIC 0505

POPULATION CC - ACTIVE INGREDIENT

FICHE/MASTER ID C5C03336

CONTENT CAT (3)

Stewart, D.K.R.; Cairns, R.G. (1974) Endosulfan persistence in soil and uptake by potato tubers. Journal of Agricultural and Food Chemistry 22(6):984-986.

SUBST. CLASS = S.

OTHER SUBJECT DESCRIPTIONS

FIIM: ECEP-20-15C5C5

LIBRARY REVIEW TIME = 9

(MH)

START-DATE

END DATE

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DATE: Nov. 29, 1979

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CONCLUSIONS:

1. Endosulfan residue levels of 0.37 and 0.03 ppm were found in the peel and pulp, respectively, of potatoes grown in soil treated with endosulfan prior to planting. The residue levels were less in subsequent years. Endosulfan residue levels found in potatoes treated with eight foliar applications of endosulfan were 0.02 ppm for the peel and pulp combined.
2. Since this section of the study did not contain environmental chemistry data, a full review was not conducted.

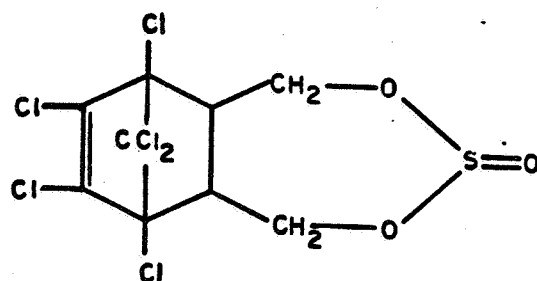
Field Dissipation - Terrestrial

1. This study is scientifically valid.
2. Both α - and β -endosulfan were converted to endosulfan sulfate. Most of the endosulfan residues resulting from surface application were found in the top 15 cm of soil. Over approximately a 2.5-year period, β -endosulfan and endosulfan sulfate were relatively persistent in soils.

3. The data from this study satisfy part of the requirements for the Field Dissipation Section 163.62-10(b) of EPA's Proposed Guidelines for Registering Pesticides (July 1978) by providing information on the dissipation of endosulfan in a sandy loam soil.

MATERIALS AND METHODS:

ENDOSULFAN, BENZOEPIN, BEOSIT, CHLORTIEPIN,
CYCLODAN, INSECTOPHENE, MALIX, THIFOR, THIMUL,
THIODAN, THIONEX, THIOSULFAN, TIONEL, TIOVEL



6,7,8,9,10,10-Hexachloro-1,5,5a,6,
9,9a-hexahydro-6,9-methano-2,4,
3-benzodioxathiepin-3-oxide

Two sets of sandy loam field plots (plots A established July 28, 1970; plots B established June 18, 1971) were treated with endosulfan (Thiodan 2E, FMC Corp.) by preplant soil incorporation at a rate of 6.7 kg ai/ha. Soil samples were collected from plots A at 1, 64, 114, 283, 408, 454, 670, 751, and 828 days after treatment at depths of 0-15 cm in 1970, and 0-15, 15-30, and 30-45 cm in 1971 and 1972. Soil samples were collected from plots B at 5, 83, 129, 354, and 503 days after treatment at depths of 0-15, 15-30, and 30-45 cm. All soil samples were air dried and sieved to 2 mm.

The endosulfan residues were extracted from the soil samples by the Soxhlet method with a 1:1 hexane:acetone solution. The extracts were evaporated to dryness on a rotary evaporator, and the residue was dissolved in hexane:acetone solution. The samples were then analyzed by gas chromatography.

A single plot was planted in potatoes. The potato foliage was sprayed eight times at approximately 1-week intervals between 30 and 90 days after planting. Soil samples were collected at depths of 0-15 cm immediately after harvest. The soil samples were analyzed as described above. This experiment was repeated the following year.

A section of this study dealt with the translocation of endosulfan in a treated crop. Since this does not deal with environmental fate, the methods used for this section will not be presented in this review.

REPORTED RESULTS:

The α - isomer decomposed rapidly with about 50% disappearing in less than 60 days (average of plots A and B). An increase in endosulfan sulfate equivalent to the α -endosulfan decomposed was observed. β -Endosulfan disappeared more slowly, with 50% disappearing in approximately 800 days. The total loss of the α - and β - isomers was approximately equal to the amount of endosulfan sulfate formed. This suggests that the two isomers were quantitatively converted to the sulfate, which appeared to be relatively stable in soil during the experiment. Analysis of the soil samples collected at depths of 0-15, 15-30, and 30-45 cm showed that 90, 9, and 1% of the endosulfan residues were present in each of the respective samples throughout the experiment.

Soil residues resulting from foliar spraying of potatoes were small and confined to depths of 0-4 cm. Residue levels of 0.1 ppm α -endosulfan, 0.1 ppm β -endosulfan, and 0.08 ppm endosulfan sulfate were found in the soil samples taken 0-15 cm deep, after the potatoes were harvested, 85 days posttreatment.

The results indicate that β -endosulfan and endosulfan sulfate are relatively persistent in soil over approximately a 2.5-year period (Figures 1 and 2).

DISCUSSION:

The results presented in Figures 1 and 2 generally support the authors' conclusion that the α - and β - isomers were transformed into endosulfan sulfate. However, at most of the points on the graphs where the concentrations of endosulfan sulfate and α - and β -endosulfan are added together they are greater than the initial concentration of endosulfan. This is because endosulfan sulfate residues appeared to increase more rapidly than the α - and β - isomers of endosulfan decrease. The reviewer believes that the results are valid despite the high recovery levels.

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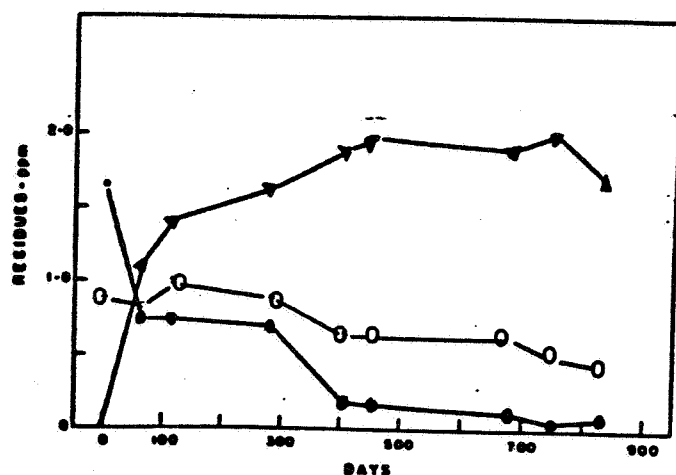


Figure 1. Residues of α -endosulfan, β -endosulfan, and endosulfan sulfate in soil resulting from incorporation of 6.7 kg/ha of endosulfan.

- \bullet α -Endosulfan
- \circ β -Endosulfan
- ∇ Endosulfan sulfate

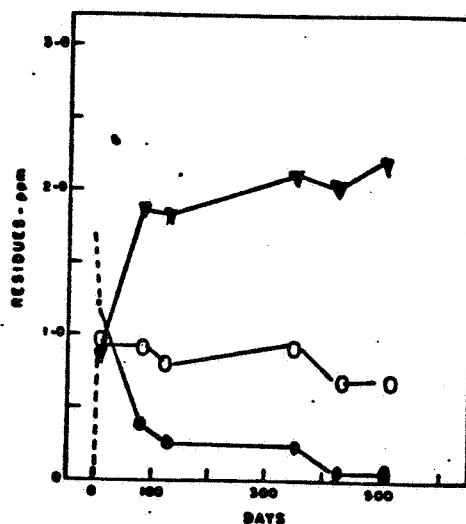


Figure 2. Residues of α -endosulfan, β -endosulfan, and endosulfan sulfate in soil resulting from incorporation of endosulfan at 6.7 kg/ha.

- \bullet α -Endosulfan
- \circ β -Endosulfan
- ∇ Endosulfan sulfate