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EEE BRANCH REVIEW

DATE:	IN _____ OUT _____	IN 1/20/76 OUT 2/5/76	IN _____ OUT _____
	FISH & WILDLIFE	ENVIRONMENTAL CHEMISTRY	EFFICACY

FILE OR REG. NO. 464-448, 499, 523

PETITION OR EXP. PERMIT NO. _____

DATE DIV. RECEIVED 1/20/76

DATE OF SUBMISSION 1/16/76

DATE SUBMISSION ACCEPTED 3C1D - No - 1/20/76

TYPE PRODUCT(S): (I) D, H, F, N, R, S

PRODUCT MGR. NO. PM-12 Sanders

PRODUCT NAME(S) Chlorpyrifos

COMPANY NAME Dow Chemical USA

SUBMISSION PURPOSE Removal or Rotational crop restrictions

CHEMICAL & FORMULATION Dursban

1.0 Introduction

1.1 Other names for chlorpyrifos are: Dursban, Dowco 179 and phosphorothioic acid 0,0-diethyl-0-3,5,7-trichloro-2-pyridyl ester.

1.2 See previous reviews on environmental chemistry for chlorpyrifos:

464-LRT	8/13/75
5G-1595	3/19/75
3F-1306	5/02/74
464-EXP	3/20/74
464-EXP	3/20/74
4F 1445	3/04/74
3F 1370	5/18/73
3F 1306	2/15/73

1.3 Dow wishes to delete the crop rotation restrictions.

2.0 Directions for use.

See previous reviews.

3.0 Discussion of data:

3.1.1 Two types of chlorpyrifos insecticide formulations were used in rotational crop study, Granular (M-3454) and emulsifiable liquid (M-3573). Both these formulations were broadcast applied to soil at the rate of six pounds a.i. chlorpyrifos per acre for two or three successive years and sugar beets and soybeans were grown in the soil during the year immediately after last treatment.

Chlorpyrifos was applied as a broadcast treatment on silt loam soil in the spring of 1971, 1972 and 1973 at the rate of 6 lb a.i./A/yr. M-3454 was applied with a scott spreader. M-3573 was applied with a constant pressure sprayer.

Sugar beets were grown on chlorpyrifos applied soil and after maturity leaves and roots were analyzed for chlorpyrifos and its metabolite trichloro pyridinol which were non-detectable in most cases or found to contain less than 0.01 ppm in case of chlorpyrifos.

There is only < 0.01 ppm and < 0.05 ppm in only few instances and non-detectable in most cases of chlorpyrifos and trichloropyridinol respectively were found in soybean green plant, silage, straw and grain grown in soil treated with chlorpyrifos at 6 lb a.i./A/yr for two consecutive years.

3.1.2 Recovery experiments were carried out with 1.0, 0.1 and 0.01 ppm in all cases but one in which case recoveries were carried out at 0.005, 0.01 and 1.0 ppm input and recoveries were found to vary between 62-99%.

Recovery experiments with 3,5,7-Trichloro-2-pyridinol gave recovery of 73-102% when carried out in ppm concentration of 0.05, 0.1 and 0.2. Similar results were obtained when mixed recovery were carried out with chlorpyrifos and trichlor pyridinol.

Above experiments were carried out in cold. The application rate of 6 lb. a.i./A/yr is 6 to 24 times greater than the actual recommended dosage which is 0.25 - 1.0 lb a.i./Acre. Therefore residue in rotational crop is not expected.

3.2 Rotational crop study using ^{14}C labeled chlorpyrifos.

3.2.1 Ring labeled ^{14}C-chlorpyrifos was formulated and applied to sandy-loam soil at 2 lb. a.i. per acre. The soil was incubated under moist, aerobic conditions for 119 days. Wheat, soybeans and sugar beets were then planted in the soil and grown to maturity.

Total residual ^{14}C activity in the soil after 119 days of incubation was 40% of the total activity applied before incubation time. 36% of the 40% of the activity was found in the top soil 0-4".

Total chlorpyrifos and its metabolites trichloro pyridinol and its methoxy ether are found to be less than 0.1 ppm in the top layer of incubated soil. None of the compound found was more than 0.05 ppm.

3.2.2 Total ^{14}C-activity in wheat plant, sugar beets and soybeans.

Days after planting	Total ^{14}C activity concentration ppm No of plants used for analysis are in parentheses Wheat plants	Sugar Beets	Soybeans
19	0.15 ± 0.04 (8)	0.09 ± 0.02 (14)	0.11 ± 0.03 (9)
39	0.10 ± 0.02 (7)	0.04 ± 0.01 (15)	0.25 ± 0.08 (9)
102 or 135 136[a]	0.31[b] (6)	0.03[c] (3)	0.31[d] (9)

a 102 days for wheat plants, 135 for sugar beet plants and 136 for soybean plants.

b Distributed as follows Grain 0.05 ppm and straw 0.52 ppm.

c Distributed as follows Beet 0.02 ppm and plant tops 0.04 ppm.

d Distributed as follows Beans 0.06 ppm and Vines 0.50 ppm.

3.2.3 Analysis of harvested wheat grain, straw, sugar beets, tops and soybeans and vines

	Residue ppm chlorpyrifos equivalent					
	Wheat		Sugar Beets		Soybeans	
Compound	grain	straw	Beets	Tops	Beans	Vines
I	<0.01	0.01	<0.01	0.01	<0.01	<0.01
II	0.03	0.01	0.02	0.06	0.02	0.03
III	0.04	<0.01	0.01	0.01	0.01	0.01

I Chlorpyrifos

II 3,5,6-Trichlor-2-pyridinol

III Methyl ether of II

Above study was carried out at 2 lb. a.i./A use; this is 2 to 8 times higher than the recommended application which is 0.25-1.0 a.i./Acre.

Conclusion:

No residue is expected in rotational crops when chlorpyrifos is applied according to recommended dosage.

4.0 Recommendations:

We concur with the removal of rotational crop restrictions.

Ronald E. Ney, Jr. 2/5/76

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Environmental Chemistry Section
Efficacy and Ecological Effects Branch

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3.2.3 Analysis of harvested wheat grain, straw, sugar beets, tops and soybeans and vines

Residue ppm chlorpyrifos equivalent

Compound	Wheat grain	Wheat straw	Sugar Beets Beets	Sugar Beets Tops	Soybeans Beans	Soybeans Vines
I	< 0.01	0.01	< 0.01	0.01	< 0.01	< 0.01
II	0.03	0.01	0.02	0.06	0.02	0.03
III	0.04	< 0.01	0.01	0.01	0.01	0.01

I Chlorpyrifos

II 3,5,6 - Trichlor-2-pyridinol

III Methyl ether of II.

Above study was carried out at 2 lb a.i/A rate, this is 2 to 8 times higher than the recommended application which is 0.25 - 1.0 a.i/Acre.

conclusion

No residue is expected in rotational crops when chlorpyrifos is applied according to recommended dosage

4.0 Recommendations

~~Recommendations~~ : We ~~have no objection~~ concur with the removal of rotational crop restrictions.

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