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OFFICE OF  
PESTICIDES AND TOXIC SUBSTANCES

SUBJECT: 81-0H-6. Section 18 exemption for chlorpyrifos on soybeans in Ohio

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and

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THRU: Charles L. Trichilo, Branch Chief  
Residue Chemistry Branch (TS-769)

The Ohio Department of Agriculture requests a Section 18 emergency authorization to use the pesticide chlorpyrifos [0,0-diethyl 0-(3,5,6-trichloro-2-pyridyl) phosphorothioate] on soybeans for control of cutworms.

The chlorpyrifos formulation Lorsban 4E (EPA Reg. No. 464-448, 4 lb. chlorpyrifos/gallon) is proposed for use. The applications were to commence immediately (date of letter of request, 6/15/81).

A single application of 1 lb active/A will be made using aerial or ground equipment (10 gal water/A for ground applications) and a PHI of 28 days is imposed. Treated soybean forage and hay are not to be fed to meat or dairy animals.

PP#9F2270 proposing a tolerance of 1.0 ppm for chlorpyrifos and its metabolite 3,5,6-trichloro-2-pyridinol (TCP) in or on soybeans is in reject status pending a reply to our TOX deferral regarding the possible significance of several unidentified and newly isolated metabolites (PP#0F2281, E.M.K. Leovey, 7/7/81). Provided that no new metabolites are in need of regulation, we concluded the following:

1. Residues of chlorpyrifos and TCP in soybeans are not expected to exceed 0.5 ppm from application of 0.5-2 lb active/A with a maximum of 3 lb active/season, provided a) a

28 day PHI is observed, b) the last two applications are made no closer than 14 days apart and c) ground applications are made in a minimum of 10 gal/A.

2. Residues in soybean processing fractions are not expected to exceed the level in the beans.

The following is a summary of our TOX deferral from PP#0F2281: In the apple metabolism study reviewed in PP#0F2281 (Leovey, 7/7/81), chlorpyrifos and TCP were observed as residues at levels of 36.3 and 5.1 - 5.6% respectively. Two metabolites (identified as A-1 and A-2, 4.3 and 4.2% of residue) were postulated to be mono-dechlorinated derivatives of chlorpyrifos from GC/MS data. The aqueous layers contained a metabolite designated B (4.9 to 5.4% of residue) which upon hydrolysis yielded TCP. The hydrolyzed insoluble material yielded metabolites C (5.2 - 5.7%), D (3.2 to 5.4%) and E (5.5 to 5.7%) which were not characterized due to a claimed lack of sufficient material. The remainder of the radioactivity was located in the hydrolyzed fractions (approximately 20-24%), insoluble material (3.3-4.5%) and aqueous layers (1.4-1.5%). The material in the unidentified hydrolyzed fraction consisted of numerous radiolabelled compounds smeared throughout the HPLC fractions. From 90-95% of the radioactivity could be traced; the remainder was probably lost in sample handling.

A soybean metabolism study was reviewed in the same petition. The <sup>14</sup>C residue in beans was characterized as 17% incorporated into natural components of the oil; 2.5% chlorpyrifos; 11% TCP; 24% extracted into the aqueous layer and containing at least seven metabolites not hydrolyzable to TCP; 18% solubilized after alkaline hydrolysis and containing a number of products which individually constituted at most 3% of the total residue; 11% in the precipitate and deduced to be incorporated into protein and 8% remaining insoluble, according to our calculations. Unidentified metabolites were claimed to be compounds arising from the plants' natural constituents.

Our deferral to TOX was whether apple metabolites B, C, D and E and the unidentified apple and soybean metabolites (particularly the water soluble metabolites) need to be identified.

Residue data from eight studies reflecting soybeans treated 4 or 5 times with 0.5 to 4 lb active/A and 18-51 day PHI's are available in PP#9F2270. None of these data reflect single applications but in no instance was the last application <1.0

lb active/A. In one study reflecting low volume ground applications (3.5 ~~gal~~<sup>gal</sup>) residue levels were <0.01 - 0.26 ppm chlorpyrifos plus 0.27-0.56 ppm TCP (max. 0.82 ppm total); maximum residue levels in the other seven studies using 10-30 gal/A ground equipment were 0.06 ppm chlorpyrifos plus 0.16 ppm TCP, or 0.18 ppm total.

In PP#0F2281, we concluded that chlorpyrifos residue levels did not differ significantly between ground and aerial applications (Leovey, 12/23/80).

We conclude that residue levels in soybeans are not likely to exceed 0.2 ppm chlorpyrifos plus TCP as a result of the single application proposed in this exemption. Based on our conclusions in PP#9F2270 as cited above, residue levels of chlorpyrifos plus TCP in soybean processing fractions will also not exceed 0.2 ppm. Feed items having established chlorpyrifos tolerances are corn grain, forage and fodder (0.1 ppm), bean forage (1 pm) and sorghum grain (0.75 ppm), forage (1.5 ppm) and fodder (6 ppm). This additional use on soybeans will not increase the dietary intake of chlorpyrifos residues by livestock. Thus we conclude that the established tolerances for eggs, milk and the meat, fat and meat byproducts of cattle, goats, hogs, horses, poultry and sheep will be adequate to cover secondary residues resulting from this use.

#### Conclusions and Recommendations

1. Provided TOX is not concerned about the unidentified soybean metabolites (particularly the water soluble metabolites) and can make their conclusions based on residue levels of chlorpyrifos plus TCP (see PP#0F2281, memo of Dr. E.M.K. Leovey, 7/7/81) we can consider the metabolism of chlorpyrifos in plants to be adequately understood for the purpose this exemption.
2. Adequate analytical methodology is available for enforcement purposes.
3. Residue levels of chlorpyrifos plus TCP are not likely to exceed 0.2 ppm in soybeans or their processing fractions.
4. Residues of chlorpyrifos plus TCP are not expected to exceed the established tolerance levels for eggs, milk and the meat, fat and meat byproducts of cattle, goats, hogs, horses, poultry and sheep.

Provided TOX can make their conclusions based on residue levels of chlorpyrifos plus TCP (see Conclusion 1), other TOX considerations permit and some administrative agreement is reached with FDA regarding the legal status of treated soybeans in commerce, we recommend in favor of this exemption.

cc:

PP#9F2270  
Sec. 18 chlorpyrifos  
Subject file  
TOX  
LMB  
Circu  
Reading file

TS-769:Reviewer:LMBradley:LDT:X77324:CM#2:RM:810:Date:7/22/81  
RDI:Section Head:RHJ:Date:7/23/81:RDS:Date:7/23/81