



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

APR 11 1986

Memorandum

OFFICE OF  
PESTICIDES AND TOXIC SUBSTANCES

Subject: 86-ND-03. Proposed Section 18 for the Use of  
Sethoxydim on flax.  
No. 169617  
RCB #741

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Thru: Edward Zager, Section Head, SRS 2 *E. Zager*  
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To: Emergency Response Section  
Registration Division (TS-767)

and

Toxicology Branch  
Hazard Evaluation Division (TS-769)

The North Dakota Department of Agriculture requests a section 18 specific exemption for the use of sethoxydim [2-[(1-ethoxyimino)butyl]-5-[2-(ethylthio)propyl]-3-hydroxy-2-cyclohexene-1-one] on flax for grass weed control on a maximum of 450,000 acres. The formulation to be used is Poast®, a 1.5 lb.a.i./gallon emulsifiable concentrate made by BASF Chemicals Corporation.

Tolerances are established for sethoxydim and its metabolites containing the 2-cyclohexene-1-one moiety (calculated as parent) in or on cottonseed (5 ppm), soybeans (10 ppm), sugar beet roots, tops (0.1, 0.2 ppm), the meat, fat, and meat byproducts of cattle, goats, hogs, horses, sheep and poultry (0.2 ppm), milk (0.05 ppm) and eggs (0.5 ppm). Numerous tolerances are pending (40 CFR 180.412). A Registration Standard has not been completed for sethoxydim.

In the proposed use, 1 application of Poast® would be made to flax at a rate of 0.1875 lb.a.i./A in 5-20 gallons total volume by ground or aerial equipment. Poast® would be applied with 1 qt. oil concentrate per acre, and a 45 day PHI would be imposed.

The metabolism of sethoxydim in plants and animals is adequately understood for the purposes of this section 18. The residues of concern are sethoxydim per se and its metabolites containing the 2-cyclohexene-1-one moiety.

Residue analyses for flaxseed and flax straw were accomplished using Methods No. 30 and 30H respectively (from BASF). Method No. 30 has undergone successful method trial for soybeans, milk and liver. Briefly, the crop is extracted with methanol/water (3/1), and the residues are oxidized to the substituted pentanedioic acids with hydrogen peroxide. These are then converted to the dimethyl esters, cleaned up by solvent partitioning into dichloromethane followed by clean-up on a silica gel column, and analyzed by GLC using a flame photometric detector. Method 30H is similar. These methods quantitate hydroxylated and non-hydroxylated residues separately. Sample chromatograms and standard curves were submitted with this section 18. The limit of detection is 0.05 ppm. Recoveries of the parent sethoxydim, its sulfoxide metabolite and its 5-hydroxylated sulfone metabolite ranged from 90-98%, 92-98% and 76-88% respectively for flaxseed; and 96-100%, 94-100% and 78-90% respectively for flax straw. Fortification levels ranged from 0.05-20 ppm.

Residue data were submitted with this section 18. These are summarized in the table below. Flax was treated with either 1 application of 0.5 lb.a.i./A (= approx. 2.7X) or two applications at 0.5 + 0.3 lb.a.i./A by an unspecified method. For fields receiving 2 applications, intervals between these applications ranged from 10-36 days. PHI's ranged from 40-113 days. Values were not corrected for recovery. Sample storage conditions were not described (approx. 10-24 months storage). It can be seen in the table that in several trials, control values were as high or higher than residues measured from treated fields. For the purposes of this section 18 we will assume that this is due to pesticide contamination of supposedly untreated fields. Additionally, we will assume that the 17 ppm residue found in seed for 2 applications and a 52 day PHI is an outlier. Based on these considerations, we concur with the submitter and estimate that total residues of sethoxydim and its metabolites containing the 2-cyclohexene-1-one moiety will not exceed 2 ppm in flaxseed and 2 ppm in flax straw when Poast® is applied as described in the proposed use.

Processed flax commodities include linseed meal and hulls. In the absence of data for processed commodities, we will assume that most (90%) of the sethoxydim residues will concentrate in the oil fractions of the flax seed. This assumption is based on the tendency of sethoxydim to translocate,

the long PHI (45 days), and the apolar nature of sethoxydim residues. Based on these considerations, we conclude that total residues of sethoxydim are not likely to exceed 2 ppm in flaxseed hulls and 0.5 ppm in linseed meal.

Residue Data for Sethoxydim and its Metabolites in or on  
Flaxseed and Flax Straw

Application Rate	Interval	PHI	Residue (total)			
			seed	seed control	straw	straw control
0.5		75	0.85	<0.1	<1.0	<1.0
"		73	0.26	1.0	<1.0	<1.0
			0.27	1.2		
			0.26	1.2		
"		82	0.33	<0.1	<1.0	<1.0
"		66	0.41	18.2	<1.2	4.9
			0.38	17.4	<1.1	5.1
			0.40	17.0	<1.1	4.8
"		99	0.24	<0.1	<1.0	<1.0
"		113	0.18	0.18	<1.0	<1.0
"		72	0.36	0.33		
				0.29		
				0.29		
"		63	0.30	1.2	<1.0	<1.0
			0.31	1.2		
			0.31	1.2		
"		67	0.17	<0.1	<1.0	<1.0
0.5 + 0.3	14	61	3.3	<0.1	<1.0	<1.0
"	33	40	1.6	1.0	1.5	<1.0
				1.2		
				1.2		
"	36	46	1.2	<0.1	<1.0	<1.0
"	14	52	17.0	18.2	5.0	4.9
				17.4		5.1
				17.0		4.8
"	22	77	1.3	<0.1	<1.0	<1.0
"	21	92	0.44	0.18	<1.0	<1.0
"	10	62	<0.1	<0.1		
"	13	50	2.0	1.2	<1.0	<1.0
				1.2		
				1.2		
"	13	54	0.89	<0.1	<1.0	<1.0

Meat, Milk, Poultry and Eggs

A diet for beef cattle could contain 2.95 ppm sethoxydim residues based on 10% flax straw (0.2 ppm), 20% flaxseed hulls

(0.4 ppm), 25% cottonseed (1.25 ppm), 10% soybeans (1 ppm) and 20% sugar beet molasses (0.1 ppm). A diet for dairy cattle could contain 3.95 ppm sethoxydim residues based on 10% flax straw (0.2 ppm), 10% flaxseed hulls (0.2 ppm), 20% cottonseed (1 ppm), 25% soybeans (2.5 ppm) and 10% sugar beet molasses (0.05 ppm). Diets for swine could consist of 3.175 ppm sethoxydim residues based on 20% flaxseed (0.4 ppm), 5% cottonseed soapstock (0.75 ppm), 20% soybeans (2 ppm) and 5% sugar beet molasses (0.025 ppm).

Cattle and poultry feeding studies were reviewed by E. Zager (memo, 12/4/80; PP#OG2396, Acc. No. 099538). Lactating dairy cows, three in each group, were fed 0.6 ppm or 50.0 ppm sethoxydim daily for 30 days. Milk samples were collected at intervals, and tissue samples were collected at sacrifice. No residues were found in any tissues or milk for cows dosed at the 0.6 ppm level. For cows dosed at the 50 ppm level, residues ranged from 0.05-0.12 ppm in liver tissues, <0.05-0.09 ppm in kidney, and were undetectable for muscle tissue and milk (at all sampling intervals). Based on this information, we conclude that total residues of sethoxydim are not likely to exceed the established tolerances of 0.2 ppm for the meat, fat and meat by-products of cattle, goats, hogs, horses and sheep; and 0.05 ppm for milk when Poast® is applied as described in the proposed use.

Laying hens were fed 1.0 ppm, 10.0 ppm or 100.0 ppm sethoxydim for 30 days. Tissue samples were collected at intervals from 8-45 days after the initial dose, and eggs were collected at intervals throughout the study. Residues in muscle tissue for the three feeding levels ranged from <0.05 ppm, <0.05 ppm and <0.05-0.19 ppm respectively. Residues in eggs ranged from <0.05 ppm, <0.05-0.34 ppm and 0.05-1.88 ppm respectively. Based on this data, we conclude that the total residues of sethoxydim are not likely to exceed the established tolerances of 0.2 ppm for the meat, fat and meat by-products of poultry; and 0.5 ppm for eggs.

### Conclusions

- (1) The metabolism of sethoxydim in plants and animals is adequately understood for the purposes of this section 18.
- (2) Total residues of sethoxydim are not likely to exceed 2 ppm for flaxseed, 2 ppm for flax straw, 2 ppm for flax hulls and 0.5 ppm for linseed meal. Total residues are not likely to exceed established tolerances for meat, milk, poultry and eggs.

(3) Analytical methods for enforcement are available (Method No. 30; PP#0G2396, Acc. No. 099538).

(4) Reference Standards are available from the Pesticides and Industrial Chemicals Repository.

Recommendations

RCB has no objections to this section 18. An agreement should be made with the FDA regarding the legal status of the treated commodities in commerce.

cc:Sethoxydim (Poast®) S.F., R.F., Section 18 S.F., Circu,  
M.Metzger, PMSD/ISB

RDI:E. Zager:EZ:4/12/86:RDS:4/12/86

TS-769:RCB:M.Metzger:MM:Rm810:CM#2:4/12/86

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