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

JUN 19 1986

OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

Memorandum

Subject: 86-CA-23. Proposed Section 18 for Sethoxydim (Poast®, EPA Reg. No. 7969-58-AA) on Alfalfa. RCB #1075

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Thru: Edward Zager, Section Head, SRS 2
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To: Emergency Response and Minor Use Section
Registration Division (TS-767C)

and

Toxicology Branch
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The California Department of Food and Agriculture requests a Section 18 Specific Exemption for the use of sethoxydim on alfalfa to control Foxtail species on approximately 150,000 acres in the San Joaquin and Sacramento valleys. The formulation to be used is Poast (20% emulsifiable concentrate, 1.53 lbs.a.i./gal).

Tolerances are established for combined residues of sethoxydim [2-[1-(ethoxyimino)butyl]-5-[2-(ethoxythio)propyl]-3-hydroxy-2-cyclohexene-1-one] and its metabolites containing the 2-cyclohexene-1-one moiety ranging from 0.05 (N) ppm for milk to 15FA ppm for cottonseed soapstock; and include 0.2 ppm for the meat, fat and meat by-products of cattle, goats, hogs, horses, sheep and poultry, and 0.5 ppm for eggs. Numerous tolerances are pending including 20 ppm for alfalfa forage and hay (40 CFR 180.412). A Registration Standard has not been completed for sethoxydim.

The proposed use includes a maximum of 2 applications to alfalfa at a rate of 1.5 pints product (4.5 ozs.a.i.)/A in a minimum of 20 gallons of water/A using "ground spray irrigation". The following restrictions apply:

> Do not graze livestock on treated areas for 7 days. Do not feed treated hay to livestock for 20 days.

A plant metabolism study for sethoxydim on alfalfa was submitted as an amendment to PP#3F2904 (Acc. Nos. 073398, 073399; K Arne, 6/26/85). It was concluded that the nature of the residue in alfalfa is adequately understood, and that the residue of concern consists of parent plus metabolites containing the 2-cyclohexene-1-one moiety.

The analytical method used to determine residues of sethoxydim and its metabolites in alfalfa forage, hay and seed is BWC Agricultural Method 30B. This method involves initial extraction of the RAC with methanol, precipitation with calcium hydroxide, dichloromethane partitioning, oxidation with hydrogen peroxide to form substituted pentanedioic acids, methylation, dichloromethane partitioning, silica gel column chromatography, and gas chromatography using a sulphur-specific flame photometric detector. Recoveries of sethoxydim and its metabolites ranged from 60-103% for alfalfa forage, 50-99% for hay and 83-110% for seed (at fortification levels of 0.05-30 ppm).

Residue data for alfalfa forage, hay and seed were submitted with PP#3F2904 (Acc. No. 071661). Alfalfa was treated at rates of 0.4, 0.5 or 1.0 lbs.a.i./A for either 1 or 2 applications, and samples of forage, hay and seed were obtained at 5-130 day PHI's. When two applications were made, the intervals between applications ranged from 20-107 days. Results are summarized in the table on the next page.

We calculate a 95% confidence limit based on these data for 2 applications at 0.5 lbs.a.i./A and reduce this value by a factor of 0.28/0.50 (proposed application rate/rate used for residue studies). Assuming approximately 75% recovery, we conclude that it is unlikely that total sethoxydim residues will exceed 25 ppm in alfalfa forage and 12 ppm in alfalfa hay.

Alfalfa meal is a processed commodity made by flash dehydration of alfalfa fodder. This method of dehydration is used rather than field-drying of the fodder because in the former method, loss of valuable nutrients is minimized. In the absence of residue data for alfalfa meal, and considering the attempt to minimize loss of nutrients (organic compounds) in the processing of fodder to produce alfalfa meal, we will assume that residues in alfalfa meal will be near those found in forage when a 20-day PHI is imposed and will therefore not exceed 12 ppm.

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Sethoxydim Residues in Alfalfa Forage, Hay and Seed

Commodity	Application Rate (lbs.a.i./A)	PHI	Residue Range (ppm)
Forage	0.5	5	10.2
"	"	7- 9	7.7 -10.7
"	"	10-20	0.27- 7.3
"	"	21-31	<0.05- 4.0
"	"	>38	<0.05-0.35
"	0.5 + 0.5	5	10.5
"	"	7- 9	8.0 -14.1
"	"	10-20	<0.05- 7.5
"	"	21-34	0.1 - 4.3
"	"	>37	<0.05- 1.3
"	0.4	23	4.4, 4.8
"	"	33	0.15
"	"	102	0.39
"	0.4 + 0.4	23	6.3
Hay	0.5	17	9.5
"	"	20-29	0.35- 5.6
"	"	31-38	0.43- 2.0
"	"	>47	<0.05- 1.6
"	0.5 + 0.5	17	12.05
"	"	20-28	0.56- 5.3
"	"	38	0.85- 4.3
"	"	>54	0.26- 0.27
"	0.4	17	10.4 ,10.5
"	"	33	<0.05
"	"	96	3.5 , 3.7
"	0.4 + 0.4	17	12.7
Seed	0.5	67	0.21
"	1.0	67	0.48

Meat, Milk, Poultry and Eggs

The diets of beef cattle could consist of 13.9 ppm sethoxydim residues based on 5% cottonseed soapstock (15 ppm tolerance), 5% soybeans (10 ppm), 20% sugar beet molasses (0.5 ppm), 20% sugar beet tops (0.2 ppm) and 50% alfalfa forage (25 ppm). The diets of dairy cattle could consist of 22.5 ppm sethoxydim residues based on 5% cottonseed soapstock (15 ppm), 15% soybeans (10 ppm), and 80% alfalfa forage (25 ppm). The diets of turkeys/broilers could consist of 3.4 ppm sethoxydim residues based on 5% cottonseed soapstock (15 ppm), 20% soybeans (10 ppm), 4% sugar beet molasses (0.5 ppm) and 5% alfalfa meal (12 ppm). The diets of laying hens could consist of 6.4 ppm sethoxydim residues based on 5% cottonseed soapstock (15 ppm), 50% soybeans (10 ppm), 4% sugar beet molasses (0.5 ppm) and 5% alfalfa meal (12 ppm).

Data for residues of sethoxydim in animal tissues were reviewed by J. Onley (1/12/84). Dairy cattle and laying hens were administered sethoxydim in their diets for 30 days. Residue data are summarized in the table below.

Sethoxydim Residues in Animal Tissues

Tissue	Residue Range	
	0.6 ppm in diet	50 ppm in diet
Milk (cow)	<0.05	<0.05
Beef muscle	<0.05	<0.05
" kidney	<0.05	0.07 - 0.10
" liver	<0.05	<0.05 - 0.15

	1 ppm in diet	10 ppm in diet	100 ppm in diet
Chicken muscle	<0.05	<0.05 (0.11)*	<0.05-0.19
" liver	<0.05	<0.05-0.17	0.23-0.47
Eggs	<0.05	<0.05-0.34	0.15-1.6

*one detectable value, questionable outlier

Based on these data, we conclude that it is unlikely that the established tolerances of 0.2 ppm for the meat, fat and meat by-products of cattle, goats, hogs, horses, poultry and sheep, 0.05 (N) ppm for milk, and 0.5 ppm for eggs will be exceeded as a result of the proposed use.

Conclusions

(1) The metabolism of sethoxydim in plants and animals is adequately understood. The residue of concern consists of parent plus metabolites containing the 2-cyclohexene-1-one moiety.

(2) Combined residues of sethoxydim are not likely to exceed 25 ppm in alfalfa forage, and 12 ppm in alfalfa hay and meal as a result of the proposed use. Residues are not likely to exceed the established tolerances of 0.2 ppm in the meat, fat and meat by-products of cattle, goats, hogs, horses, poultry and sheep, 0.05 (N) ppm in milk, and 0.5 ppm in eggs as a result of the proposed use.

(3) The following restrictions apply to applications of sethoxydim to alfalfa:

Do not graze livestock in treated areas for 7 days. Do not feed treated hay to livestock for 20 days.

These restrictions are vague and should be revised to the following:

> Do not graze livestock on treated areas for 7 days following final application of Poast®. Do not cut alfalfa for hay or fodder for 20 days following final application of Poast®.

(4) Analytical methods are available for enforcement (PP#3F2904, Acc. No. 071661 for hay and straw: Method No 30B; PP#0G2396, Acc. No. 099538 for animal tissues).

(5) Analytical reference standards are available from the Pesticides and Industrial Chemicals Repository.

Recommendations

TOX considerations permitting, RCB has no objections to this section 18 provided the restrictions discussed in (3) above are changed as described. 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
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