PMSD/HSB

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

Subject: PP#3F2904. Sethoxydim (Poast) on Alfalfa and Soybeans. Method Validation Report. No MRID or DEB Numbers.

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Method I of PAM II for sethoxydim (Poast) has been successfully tried on three metabolites of the herbicide sethoxydim (Poast), 2-[1-(imino)butyl]-5-[2-(ethylsulfinyl)propyl-3-hydroxy-2-cyclohexene-1-one, referred to as M1SO; 2-[(1-ethoxyimino) butyl]-5-[2-(methylsulfinyl)propyl-3-hydroxy-2-cyclohexene-1-one, referred to as nor-MSO; and 2-[1-(ethoxyimino)butyl]-5-[2-methyl-sulfonyl)propyl-3-hydroxy-2-cyclohexene-1-one, referred to as nor-MSO_2; on milk at 0.05 ppm and 0.1 ppm; and on beef liver at 0.2 and 0.4 ppm (memo of Calvin Corley, ACB/BEAD, 12/31/87).

In the method validation request, the statement "A method trial is requested for the metabolites M1SO, nor-MSO, nor-MSO_2, and nor-DME" should have been correctly stated "A method trial is requested for the metabolites M1SO, nor-MSO, nor-MSO_2, as nor-

nor-DME" should have been correctly stated "A method trial is requested for the metabolites M1SO, nor-MSO, nor-MSO_2, as nor-DME", since the nor-metabolites are derivatized to the corresponding nor dimethyl ester (nor-DME). The dimethyl ester derivatives, DME, OH-DME, and nor-DME; are the standard compounds for sethoxydim when Method I of PAM II is used for residue analysis. These derivatives, as well as reference sethoxydim and metabolites including the nor-metabolites are in the possession of the US EPA Pesticide and Industrial Chemical Repository. Successful method validation is reported in PAM II for sethoxydim and metabolites. MSO_2, $M2SO_2$,and OH-MSO_2 (memo of K.Kissler, PP#2F2670, 4/1/83).

In a recent amendment to PP#3F2904, it was apparent that M1SO is a significant metabolite of sethoxydim in poultry tissues; whereas, the nor-metabolites, nor-MS, nor-MSO, and nor-MSO_2, are significant metabolites of sethoxydim in milk and ruminant tissues.

Tolerances are expressed as the combined residues of the parent and metabolites containing the 2-cyclohexene-1-moiety (40CFR§180.412). Since known plant and animal metabolites contain the 2-cyclohexene-1-one moiety, the occurrence of these metabolites in milk and livestock tissues have no effect on the tolerance expression nor on the magnitude of the tolerances regulated under 40CFR§180.412 for sethoxydim.

When DEB requested the method validation, the petitioner has proposed tolerances of 10 ppm for soybean hay, 40 ppm for alfalfa hay and forage, and 0.05 ppm for milk. These tolerances are currently established under 40CFR§180.412.

Summary of the Method

In this method, residue of Poast and its metabolites are extracted from samples with water/methanol, or acetonitrile, depending on the sample matrix. After the sample extracts are cleaned up by alkaline precipitation and acidic back extraction, the parent compound and the metabolites are oxidized to 3-[2-(ethoxysulfonyl)propyl]pentanedioic acid, 3[2-(methoxysulfonyl)propyl]pentanedioic acid, and 3-[2-(ethoxysulfonyl)propyl]-3-hydroxypentanedioic acid, then derivatized to the corresponding dimethyl esters, referred to as DME, nor-DME, and OH-DME, respectively. The derivatives are partitioned into methylene chloride and cleanedup by silica gel column chromatography. Some samples require additional HPLC cleanup step. The parent compound and the combined metabolites are determined as the poentanedioic acid dimethylesters by GLC with flame photometric detection. The total residue found is expressed in sethoxydim equivalents.

Determination of sethoxydim metabolites is by the use of a

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correction factor (based on the MW) from DME, nor-DME, and OH-DME to the corresponding metabolites.

In this method validation, method sensitivity was reported at 0.01 ppm for milk, and 0.05 ppm for beef liver. Recoveries were reported for M1SO, nor-MSO, and nor-MSO_2, in milk and beef liver at 68 to 107% as shown in Table 1 below. Sample chromatograms are included.

In a separate test, the EPA Laboratory in Beltsville injected a mixture of DME and nor-DME into GC and the results showed separate peaks for each derivative. Retention time for nor-DME and DME were reported at 5.6 and 6.9 minutes, respectively (memo of Calvin Corley, 12/31/87). A GC column packed with 3% OV-17 operated at ~200°C, was employed in both situations.

Conclusion and Recommendation

RCB concludes that Method I of PAM II for sethoxydim (Poast) is adequate for residue determination of M1SO and the nor-metabolites, nor-MS, nor-MSO, and nor-MSO_2 in milk and livestock tissue. The results of this method tryout may be used for updating Method I of PAM II. Further, in the conversion Table appearing in PAM II, the following correction factors may be added:

Derivative	Correction Factor	Metabolite
nor-DME	1.06	nor-MS
	1.12	nor-MSO
	1.17	nor-MSO_2

Table 1. Percentage Recoveries of Sethoxydim Metabolites, M1SO, Nor-MSO, and Nor-MSO_2 from Fortified Milk and Liver Samples:

Commodity	Chemical Added	PPM Added	PPM Found	Percent Recovery
Milk	Control	00	<0.01	
	M1SO	0.05	0.035	70
		0.05	0.042	84
		0.10	0.086	86
		0.10	0.09	90
	Nor-MSO	0.05	0.053	107
		0.05	0.053	107
		0.10	0.079	79
		0.10	0.081	81

	Nor-MSO_2	0.05	0.042	84
		0.05	0.035	70
		0.10	0.09	90
		0.10	0.071	71
Liver	Control	00	<0.05	
	MISO	0.2	0.14	70
		0.2	0.16	80
		0.4	0.30	75
		0.4	0.30	75
	Nor-MSO	0.2	0.17	87
		0.2	0.18	90
		0.4	0.40	100
		0.4	0.37	90
	Nor-MSO_2	0.2	0.20	100
		0.2	0.16	80
		0.4	0.38	96
		0.4	0.27	68

cc: Circu, RF, SF (sethoxydim or Poast), S. Malak, PP#3F2904, PP#2F2670, PM #25 (Taylor/Walter), FDA (Alice Marcotte), and PMSD/ISB (Theresa Murtagh).

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