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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: Flumetsulam on Soybeans and Field Corn. New Chemical Registration. Issues to be Presented at the 4/21/93 Meeting of the HED Metabolism Committee.

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Debra Edwards 4/16/93

TO: Members of the HED Metabolism Committee

Flumetsulam (DE-498; N-(2,6-difluorophenyl)-5-methyl-1,2,4-triazolo-[1,5a]-pyrimidine-2-sulfonamide) is a new herbicide for which temporary tolerances are established on field corn grain, forage, and fodder and soybeans at 0.05 ppm (PP#1G04006, N. Dodd, 8/20/92 and PP#2G04149, N. Dodd, 12/23/92).

The temporary tolerances are established for parent per se. No detectable residues of parent per se were found in soybean grain or in corn grain, forage, and fodder treated postemergently at 1X. No detectable residues of parent per se were found in postemergent field trials of corn grain at 3X and soybean grain at 6X (PP#1G4006, N, Dodd, 3/27/92).

The company has not indicated whether the analytical method which was used to analyze field trial samples would determine metabolites. Residues were reported as parent per se. The method determines the parent compound (as the N-methyl derivative) without any hydrolysis or cleavage to a common moiety. Therefore, if major metabolites such as DFATSA and the 5-CH_2OH metabolite (see Attachment 1 for structures) were determined by the method, they would most likely occur as separate GC/MS peaks.

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No permanent tolerances have been established.

Permanent tolerances are now proposed for field corn grain, forage, and fodder and soybeans at 0.05 ppm (PP#2F4036, N. Dodd, 4/14/93).

The preemergent application rate to both soybeans and field corn is 0.03- 0.07 lb ai/A. The postemergent application rate to field corn is 0.015-0.06 lb ai/A. The postemergent application rate to soybeans is 0.0075-0.015 lb ai/A.

General restrictions on both the soybean and corn labels are a limitation of 1 application per year and a preharvest interval of 85 days. Application can be made to field corn up to 12" tall and to soybeans from the first to the fifth trifoliate leaf stage of growth. Grazing and feeding restrictions are on the soybean label for soybean forage, hay, and straw.

Pages 4-14 of this memo contain more details of the metabolism studies in soybeans and corn. Table 4 summarizes the distribution of metabolites in soybean commodities. Tables 6 and 8 summarize the distribution of metabolites in corn commodities. Attachment 1 contains chemical names and structures for flumetsulam and its metabolites. Attachments 2 and 3 are the metabolic pathways for soybeans and corn, respectively.

Particular attention should be paid to the following points:

Total activities in mature beans (soybeans) were only 0.043 and 0.020 ppm from the phenyl and pyrimidine labels, respectively, following pre-plant incorporated application at a 3.5X rate (Table 2). Total activities in mature beans (soybeans) treated postemergence (as stated in PP#1G4006, N.Dodd, 3/27/92) were 0.015 ppm (reflecting a 3.3X treatment rate with the (5-^{14}C)-pyrimidine label) and 0.021 ppm (reflecting a 5X treatment rate with the ^{14}C-phenyl label).

No detectable radioactivity (<0.005 ppm) was found in corn grain after postemergence treatment at a 3X rate.

Identified residues indicate that the sulfonamide linkage is stable. The potential metabolite/hydrolysis product 2,6-difluoroaniline (2,6-DFA) was not found in soybean commodities. In corn, specific analyses for 2,6-difluoroaniline were not conducted.

The metabolic pathways differ in soybeans and corn. In soybeans, the major pathway involves cleavage of the pyrimidine ring to yield hydroxybutyl-DFATSA (metabolite D2) and DFATSA (metabolite C1). In corn, the major pathways are hydroxylation of the methyl group attached to the pyrimidine ring and hydroxylation of the 4-position of the phenyl ring.

Question: Adequate metabolism studies on corn and soybeans have been submitted. CBTS would like the HED Metabolism Committee to determine the residues of concern in soybeans and corn. If the residue of concern includes more than parent *per se*, analytical methods and residue data will be needed for those additional residues of concern.

Soybean Metabolism

Table 1. Metabolite identification from reanalysis of [phenyl-^{14}C]flumetsulam postemergence soybean forage reflecting a 5X postemergent application rate.

Metabolite/fraction[a]	%TRR	ppm
A1	3	0.06
A2	9	0.15
B1	16	0.26
C[b]	4	0.07
D2	4	0.06
DE-498	1	0.02
F[c]	5	0.08
Identified residues	38	0.7
Acid hydrolysate of solids	13	0.22
Cellulose	2	0.04
Unanalyzed extractables	16[d]	0.27
Unaccounted		
from solids	11	0.19
from aqueous	5	0.09
Total	85	1.51

[a]See Attachment 1 for chemical names and molecular structures of flumetsulam and metabolites.

[b]Component C includes metabolites C1, C2, and C3.

[c]Component F is strongly retained material and may be multi-component.

[d]Includes 4% from organo-solubles and 12% in aqueous filtrate following $KMnO_4$ oxidation to isolate cellulose.

Table 2. Total radioactive residues in soybean samples following pre-plant incorporated application of [^{14}C]flumetsulam at approximately a 3.5X application rate.

Matrix	TRR (ppm)	
	[phenyl ^{14}C]	[5-pyrimidine ^{14}C]
22-Day thinnings	3.1	2.2
42-Day forage	1.4	0.73
63 Day bloom forage	0.15	0.047
139 day beans	0.043	0.020
139 day trash	0.32	0.20

RIN # 4644-93 EFGW Review & Residue Chemistry Review for Flumetsulam (129016)

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Pages 6 through 18 are not included.

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