1/26/81

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Received PM-23 1/30/81 jwb

DATE

SUBJECT: PP#OF2417 Metolachlor on flax. Evaluation of analytical method and residue data.

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TO: Richard Mountfort, PM, Team 23
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Hazard Evaluation Division (TS-769)

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

The Agricultural Division of CIBA-GEIGY Corporation proposes a tolerance of 0.2 ppm for residues of the herbicide metolachlor (2-chloro-N-(2-ethyl-6-methylphenyl)-N-(2-methoxy-1-methylethyl)acetamide on flax seed. Included in this tolerance are two metabolites, 2-[2-(ethyl-6methylphenyl)amino-1-propanol (CGA 37913) and 4-(2-ethyl-6-methylphenyl)-2-hydroxy-5-methyl-3-morpholinone (CGA-49751) each expressed as the parent compound.

Tolerances for metolachlor are established for eggs, milk and for the meat, fat and meat byproducts of cattle, goats, hogs, horses, poultry and sheep (all at 0.02 ppm) and for corn grain (except popcorn) and soybean, both at 0.1 ppm. A recently submitted petition (PP#OF2416) proposed a tolerance of 0.3 ppm for sunflower seeds.

Conclusions

1. The nature of the residue in adequately understood.

2. Adequate analytical techniques are available for enforcement purposes.

3a. Residues of metolachlor in flaxseed will not exceed the proposed tolerance.

3b. A tolerance should be proposed for flax straw; we calculate an adequate tolerance for straw to be 0.6 ppm.

3c. Based on the sunflower seed fractionation study we conclude that feed a additive tolerance of 0.4 ppm is needed for flaxseed meal and flax hulls.

4. Secondary residues resulting form the proposed tolerances for flax seed and the suggested tolerances for flax straw, meal and hulls will not increase metolachlor residues in meat, milk, poultry and eggs to levels higher than the existing tolerances.

Recommendations

We recommend against the proposed tolerance for the reasons listed in conclusions 3b and 3c. For a favorable recommendation we require the following:

1. A tolerance proposal of 0.6 ppm should be proposed for flax straw.

2. A tolerance proposal of 0.4 ppm for flaxseed meal and hulls.

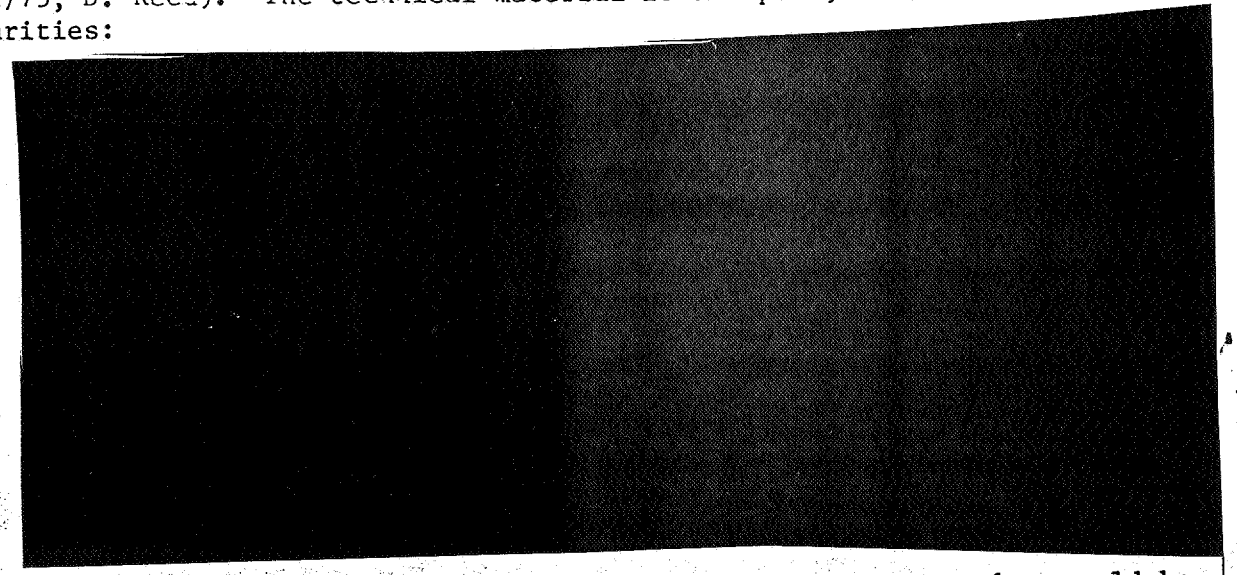
DETAILED CONSIDERATIONS

Formulation

The formulation proposed for use on flax is DUAL® 8E Herbicide, an emulsifiable concentrate that contains 8 lb a.i./gal. The inert ingredients are cleared under section 180.1001.

Manufacture

The manufacturing process was reviewed in conjunction with PP#5G1553 (memo of 2/12/75, D. Reed). The technical material is 95% pure; it contains the following impurities:



We do not expect any residue problems from these impurities as they would be present in extremely low levels from the proposed use.

Identification of product impurities

Proposed Use

For the control of a variety of weeds Dual 8E is to be used as a preplant treatment incorporated in the soil or as a preemergent surface applied treatment. The rate varies from 1.5 to 3.0 lb a.i./A depending on the soil type and the percent organic matter. It is not to be used on muck or peat soils.

There are a number of rotational crop and replacement crop planting instructions.

Nature of the Residue

Studies designed to determine the metabolism of metolachlor in corn and soybeans were submitted with PP#s 5G1553, 6F1606 and 6G1708 and were discussed in our reviews of those petitions.

In both corn and soybeans the major metabolic pathway involves conjugation with glutathione, formation of the mercaptan, conjugation of the mercpatan with glucuronic acid, hydrolysis of the methyl ether and conjugation of the alcohol with a neutral sugar.

Animal metabolism studies have been carried out in rats and goats using ^{14}C labeled metolachlor and in goats only using ^{14}C biosynthesized metabolites. These studies were discussed in our review of PP#5G1553 (memo of 2/12/75, D. Reed). They show that metolachlor is rapidly eliminated with only trace residues remaining in tissues (liver). Comparison of the urine metabolites with those found in corn indicate that, although the conjugating natural compounds are different, the hydrolyzed pesticide moieties are similar in plants and animals. The significant components of the residue consist of the parent compound and two of its metabolites: 2-[2-ethyl-6-methylphenylamino]-1-propanol and 4-[2-ethyl-6-methylpheny1]-2-hydroxy-5-methyl-3-morpholinone. The analytical method determines these components and their conjugates.

The metabolism of metolachlor in plants and animals is adequately understood.

Analytical Methods

The method used to collect residue data is a variation of Analytical Method AG-286 (CIBA-GEIGY) which has undergone a successful method trial (PP#5F1606, memos of 7/28/76 and 7/29/76, R.R. Watts). The method involves the hydrolysis (boiling overnight with 6N hydrochloric acid) of metolachlor and metabolite residues to CGA 37913 and CGA 49751 which are then determined separately.

CGA 49751 is partitioned into dichloromethane from an aliquot of the acid extract. The dichloromethane phase is washed with 5% sodium carbonate then chromatographed on a 16% moisture silica gel column. The CGA 49751 is then converted to the chloroethanol derivative which is extracted into hexane and cleaned up on a 16% moisture silica gel column. Quantitation is by GC equipped with a Dohrmann microcoulometric detector specific for chloride or an alkali flame ionization detector in the nitrogen mode.

CGA 49751 is partitioned into hexane from a second aliquot of the hydrolysis mixture which had been made basic with 50% sodium hydroxide solution. The hexane portion (containing the CGA 37913) is chromatographed on an 18% mositure alumina column, then on a silica gel column. Quantitation is by GC equipped with a Hall electrolytic conductivity detector specific for nitrogen.

Applied to flax seed, forage and straw this method gave the following check and recovery values:

	Check		Recovery					
			CGA 37913			CGA 49751		
	CGA 37913	CGA 49571	range (%)	avg.	fort.	range (%)	avg.	fort.
flaxseed	0.03	<0.05-0.05	56-113	100	0.05-0.1	48-100	81	0.05-0.1
straw	<0.03	-	80-92	87	0.05	-		
forage	<0.03-0.07	<0.05	82-91	88	0.1	76-104	87	0.1

Interference prevented straw from being successfully analyzed for CGA 49751. We will use the flax forage data (and a concentration factor) to establish a tolerance for straw. Since flax straw is a minor feed item and since the enforcement method is adequate for forage we are not concerned that the method is not entirely suitable for flax straw. We conclude adequate analytical techniques are available for enforcment of the proposed tolerance.

Residue Data

Experiments designed to determine residues of metolachlor in treated flax were carried out in North Dakota, South Dakota and Minnesota. These states produce greater than 99% of the U.S. flax crop.

Residues of metolachlor (determined as CGA-37913 and CGA 49751 and reported as metolachlor equivalents) as a result of the proposed use ranged from the limits of detection (0.03 ppm for CGA-37913 and 0.05 ppm for CGA 49751) to 0.18 ppm. The type of application (preemergence or preplant incorporated) did not significantly affect residue levels in the crop. We conclude that the proposed tolerance (0.2 ppm) is adequate.

Residue of CGA 49751 in straw were not determined because of interference. From the forage residue data (maximum residue from the proposed use was 0.21 ppm) we conclude that a reasonable tolerance for straw (assuming concentration factor of 3x) would be 0.6 ppm.

No flaxseed processing study has been submitted. Fractionation studies on peanuts and sunflowers were submitted with PP#s 9F2203 and 0F2415, respectively. In the peanut study neither solvent or screw press extraction effected concentration of residues in any of the products when nutmeats carrying residues of 0.05-0.07 ppm were processed. In the sunflower study seeds carrying residues of 0.14 to 0.17 ppm metolachlor equivalents upon processing gave solvent extracted meal containing 0.25 to 0.30 ppm metolachlor equivalents; the hulls had residue of 0.24 to 0.26 ppm. No other fractions (crude oil, refined oil, soapstock) showed a concentration of residues. Based on these studies and in the absence of a flaxseed processing study we conclude that residues of metolachlor in flaxseed meal and hulls may concentrate by a factor of two; therefore feed additive tolerances are required. The petitioner should propose tolerances of 0.4 ppm for both flaxseed meal and hulls.

Meat, Milk, Poultry and Eggs

Flax meal and hulls may be used as feed items.

Cattle feeding studies were submitted with PP#7F1913 (memo of 6/14/77, D.V. Reed). Cattle were fed at levels of up to 5 ppm metolachlor in the total diet for 28 days. No detectable residues were found in milk (<0.006 ppm CGA-37913, <0.01 ppm CGA-49751) or in any of the tissues (<0.02 ppm CGA-37913, <0.04 ppm CGA-49751).

A goat metabolism study utilizing C^{14} labeled metolachlor at 4.7 ppm in the diet resulted in residues of up to 0.07 ppm in liver and 0.01 ppm in milk.

A cattle diet (including feed items for which metolachlor tolerances are estalished or have been proposed) that would be expected to result in the highest possible amount of metolachlor in the total diet is as follows:

Feed item	Tolerance	% in diet	ppm in diet
peanut forage	3.0	25	0.75
flax straw	0.6	10	0.06
flax seed	0.2	30	0.06
corn grain	0.1	15	0.015
sunflower meal	0.6	20	0.12
		100	1.0

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The feeding studies indicate that cattle fed 1.0 ppm metolachlor in the total diet would not be expected to have residues exceeding the established tolerance for tissues and milk. Since other livestock are fed less of these items we extend this conclusion to include goats, hogs, horses and sheep (Sec. 180.6(a)(2)).

Poultry feeding studies submitted with PP#7F1913 were used to establish a tolerance of 0.02 ppm for metolachlor in poultry tissues and eggs. Chickens fed 0-2 ppm metolachlor in the total diet for 28 days accummulated no residues (<0.02 ppm CGA-37913, <0.04 ppm CGA-49751) in eggs, muscle or fat. Residues of 0.02 ppm and 0.03 ppm of CGA-37913 were found in liver from chickens at the 0.5 and 2.0 ppm level, respectively. Since flaxseed and meal are a minor feed item (up to 3% of the diet) the maximum amount of metolachlor that this use would add to poultry diet (from flaxseed meal with a 0.4 ppm tolerance) would be 0.012 ppm. The metolachlor residues possible in poultry feed from all feed items (for which metolachlor tolerances are established or proposed) carrying residues is approximately 0.2 ppm in the total diet (delineated in our review of PP#0F2416). Since this is below the level at which any residues were realized in poultry tissue or eggs in the feeding study, secondary residues in poultry tissues and eggs would not exceed the established tolerances (Sec. 180.6(a)(2)).

INTERNATIONAL RESIDUE LIMIT STATUS

CHEMICAL Metolachlor

PETITION NO OF2417 (K.ARNE)

CCPR NO. --

Codex Status

/ x / No Codex Proposal Step 6 or above

Residue (if Step 9): NONE

Crop(s)	Limit (mg/kg)
NONE	

Proposed U. S. Tolerances

Parent & 2 metabolites
1) 2-[2-ethyl-6-methylphenyl)amino-1-propanol

2) 4-(2-ethyl-6-methylphenyl)-2-hydroxy 5-methyl-3-morpholinone

Residue:

Crop(s)	Tol. (ppm)
flaxseed	0.2 ppm

CANADIAN LIMIT

Residue: 2-chloro-6'-ethyl-N-(2-methoxy-1-methylethyl)-O-acetotoluidide

Crop	Limit (ppm)
NONE on this commodity	

MEXICAN TOLERANCIA

Residue: NONE

Crop	Tolerancia (ppm)
NONE	

Notes:

1981

Memorandum

SUBJECT: PP#0F2417. Metolachlor on flax. Amendment of 2/19/81.

FROM: K.H. Arne, Ph.D., Chemist
Residue Chemistry Branch
Hazard Evaluation Division (TS-769)

TO: Richard Mountfort, Product Manager
Team No. 23, Registration Division (TS-767)
and
Toxicology Branch
Hazard Evaluation Division (TS-769)

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

In our review of the subject petition (1/26/81) we advised the petitioner that a favorable recommendation would require a tolerance proposal of 0.6 ppm for flax straw and a feed additive tolerance proposal of 0.4 ppm for flaxseed meal and hulls.

With this amendment the petitioner has submitted a revised Section F which includes the requested changes. The proposal of 0.2 ppm for flaxseed remains the same.

Recommendation:

Toxicological considerations permitting, we recommend for the proposed tolerances as indicated above.

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