(3-17-97)

MRID 44087401

MEMORANDUM

SUBJECT: **Cacodylic Acid Reregistration.** Cottonseed Processing Study. CBRS No.: 17541 DP Barcode Nos.: D229203 and D229837 MRID No.: 44087401 Chemical Nos.: 012501 and 012502 Reregistration Case No.: 2080

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In support of the reregistration of cacodylic acid for use on cotton, Luxembourg Industries, Ltd. has submitted a cottonseed processing study (1996; MRID 44087401). These data are reviewed herein for their adequacy to fulfill residue chemistry guideline requirements (GLN 860.1520).

CONCLUSIONS/RECOMMENDATIONS

Pending the receipt of supporting storage stability data, the submitted study (1996; MRID 44087401) is deemed adequate to satisfy cottonseed processing data requirements (GLN 860.1520) regarding the reregistration of cacodylic acid and its sodium salt for use on cotton. Residues of cacodylic acid did not concentrate in hulls, meal, or refined oil processed from undelinted cottonseed bearing detectable residues.

DETAILED CONSIDERATIONS

Background

Cacodylic acid (dimethylarsinic acid or DMAA) and its sodium salt are contact herbicides registered for use as defoliants on cotton.

Tolerances are currently established for residues of the defoliant cacodylic acid (dimethylarsinic acid), expressed as As_2O_3 in/on cottonseed at 2.8 ppm, in kidney and liver of cattle at 1.4 ppm,

and in meat, fat, and meat byproducts (except kidney and liver) of cattle at 0.7 ppm [40 CFR §180.311].

The HED Metabolism Committee has discussed monosodium methanearsonate (MSMA), disodium methanearsonate (DMSA), and cacodylic acid (CA) plant and animal metabolism, collectively, and, based on available data and published information, has concluded that, with regards to cacodylic acid, the residue of concern (i.e., that which is of toxicological concern and requires regulation) associated with the use of cacodylic acid is cacodylic acid, *per se*, calculated as As_2O_3 (HED Metabolism Committee memo by C. Swartz and B. Cropp-Kohlligian dated 1/26/95).

Luxembourg Industries, Ltd. has submitted data (1996; MRID 44087401) from a processing study depicting the magnitude of cacodylic acid residues in the processed commodities of cottonseed. [NOTE: In the current submission, the registrant also provided data depicting the magnitude of methylarsenic acid (MAA) residues in/on cottonseed and processed cottonseed commodities resulting from the treatment of cotton with cacodylic acid. However, these data will not be discussed herein because: (i) the Agency has concluded that only residues of cacodylic acid resulting from the use of cacodylic acid are to be regulated and (ii) no detectable residues of MAA were found in/on any test/control sample.] The question of cumulative risk resulting from food/feed use(s) of arsenicals will be addressed at the time of the respective Reregistration Eligibility Decisions (REDs).

Analytical Method

The registrant provided descriptions of and method validation data for three (3) gas chromatography/ mass selective detection (GC/MS) methods that were used to determine residues of cacodylic acid in/on cottonseed and its processed fractions, hulls, meal, and refined oil in the subject processing study. These methods are very similar and have a stated limit of quantitation (LOQ) of 0.05 ppm. Briefly, CA residues are extracted from samples with water and derivatized by reaction with methyl thioglycolate under acidic conditions. The derivatized CA analogs are partitioned into hexane and analyzed by GC/MS.

Method validation and concurrent method recoveries were conducted to demonstrate the suitability of these methods for data collection purposes. Untreated cottonseed samples from the subject processing study were fortified with cacodylic acid at 0.0510 ppm, 0.102 ppm, 0.510 ppm, 1.02 ppm, 2.04 ppm, and 3.06 ppm and meal, hull, and oil samples were fortified with cacodylic acid at 0.0510 ppm, 0.102 ppm, and 0.510 ppm. Fortified samples, along with control samples for each commodity, were analyzed using the GC/MS methods described above. Representative chromatograms, sample calculations, and standard curves were provided.

Although recoveries below 70% were obtained from fortified cottonseed (44-67%), hull (57-68%), and refined oil (66%-67%) samples, average recoveries for residues of CA in/on cottonseed (76%), hull (70%), meal (93%), and refined oil (76%) samples were within an acceptable range. Apparent residues of CA in/on all control samples were nondetectable with the exception of the control cottonseed sample from the LA test site in which CA residues were detected at 0.0254 ppm. A summary of the recovery data is provided below in Table 1.

Table 1. Method validation and concurrent method recoveries of cacodylic acid residues from fortified samples of untreated cottonseed and its processed commodities analyzed by GC/MS.

Matrix Residue of Concern	Fortification Levels (ppm)	Percent Recoveries (Number of Samples) [a]	Average Percent Recovery
Cottonseed			
Cacodylic acid	0.0510 - 3.06	44; 54; 61; 64; 67; 71-106 (8)	76
Hulls			
Cacodylic acid	0.0510 - 0.510	57; 62; 64; 65; 68; 76-93 (3)	70
Meal			
Cacodylic acid	0.0510 - 0.510	78-112 (8)	93
Refined Oil			
Cacodylic acid	0.0510 - 0.510	66; 67; 72-88 (6)	76

[a] Recovery values outside the 70-120% range are listed separately. Recovery values are uncorrected with the exception of the concurrent method recoveries for CA residues in/on cottonseed which were corrected for apparent CA residues detected in the control cottonseed sample from the LA test site (0.0254 ppm).

Cottonseed Processing Data

Current Use patterns: Two soluble concentrate formulations of cacodylic acid and its sodium salt (having 15.34% or 15.4% total elemental arsenic in water soluble form) are registered to Luxembourg Industries, Ltd. (EPA Reg. Nos. 42519-5 and 42519-10) for use as cotton defoliants. A single foliar spray application at the maximum use rate of 1.16 lb ai/A with ground or aerial equipment may be made to cotton when 50% or more of the bolls are open (7 to 10 days prior to anticipated picking).

Discussion of the data: Cotton grown in TX and LA was harvested 7 days following a single (1) foliar application of Cacodylate 3.25 at a target treatment rate of 1.2 lb ai/A (actual rate: 1.18 lb ai/A in TX and 1.22 lb ai/A in LA) in 15-25 gal/A using ground equipment (airblast sprayer). A surfactant was added to the spray solutions at a target rate of 0.33pt/A.

At each test site one treated and one untreated cottonseed sample was harvested by mechanical harvester. All samples were stored at ambient temperatures within two hours of harvesting and shipped within one day to the processor (Texas A&M University Food Protein Research and Development Center in Bryan, TX). Upon receipt at the processor (within two days of harvesting) cottonseed samples were stored frozen and later ginned and processed into hulls, meal, and refined oil using procedures which simulated normal commercial processing practices. The harvested cottonseed was ginned at the processing center. The ginned cottonseed was delinted, hulled, and separated into kernels and hulls. The kernel material was heated, flaked, expanded to form "collets", and extracted with hexane. Warm air was passed through the extracted collets for desolventization and a sample of cottonseed meal was taken from the desolventized collets. The hexane extract was evaporated to remove the hexane, yielding crude cottonseed oil. The crude oil was then mixed with sodium hydroxide and heated resulting in refined oil and soapstock. Undelinted cottonseed, hull, meal, and refined oil samples were stored frozen (-29 to -2 C) at the processing center for up to 3 months before they were shipped to the analytical laboratory.

Following processing, samples of undelinted cottonseed, hull, meal, and refined oil were shipped to the analytical facility (Corning Hazleton, Inc. in Madison WI) where they were stored frozen (-30 to -10 C) for up to 5 months prior to analysis by GC/MS.

The maximum storage interval from harvest to analysis for samples from the subject study was 8 months. Adequate raw data pertaining to field trial information, application of the test substance, sample handling, and processing procedures (including material balance) were provided.

Residues of cacodylic acid in/on treated and untreated cottonseed (undelinted) and cottonseed processed commodities were determined using an adequate data collection method. The results of the cottonseed processing study are presented in Table 2. Apparent residues of cacodylic acid in/on all of the untreated controls were nondetectable with the exception of the control cottonseed sample from the LA test site in which CA residues were detected at 0.0254 ppm.

Table 2. Residues of cacodylic acid in/on cottonseed and its processed commodities resulting from treatment to cotton with Cacodylate 3.25 at the maximum application rate.

Substrate	Residues (ppm)[a]		Average Concentration/Reduction Factor[b]
	LA Test Site	TX Test Site	
cottonseed (undelinted)	0.32	0.20	--
hulls	0.26	0.09	0.7
meal	<0.05	<0.05	<0.2
refined oil	<0.05	<0.05	<0.2

[a] Residues levels uncorrected.

[b] For residue levels below the LOQ a value of 0.05 ppm was used in the calculation.

Study summary: Data indicate that residues of cacodylic acid do not concentrate in hulls, meal, and refined oil processed from undelinted cottonseed bearing detectable residues of cacodylic acid.

Storage Stability Data

No data are available depicting the frozen storage stability of cacodylic acid in/on cottonseed and processed cottonseed commodities; however, a storage stability study was initiated concomitant with the subject processing study. Since samples from the subject study were held in frozen (-30 to -2 C) storage for up to 8 months prior to analysis, storage stability data are required to support the subject magnitude of the residue data.

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