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OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: Thidiazuron. Protocol for Confined Rotational Crop Study. Reregistration Case No. 4092. Chemical No. 120301. No MRID #. DP Barcode D201247. CBRS #13,481.

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Thidiazuron, or 1-phenyl-3-(1,2,3-thiadiazol-5-yl)urea, is a herbicide used for the defoliation of cotton. Tolerances have been established (40 CFR § 180.403) for the combined residues of thidiazuron and its aniline-containing metabolites in/on cottonseed (0.4 ppm), poultry and ruminant meat/fat/mbyop (0.2 ppm), eggs (0.1 ppm), and milk (0.05 ppm). A feed additive tolerance exists (40 CFP § 186.5600) for the same residue in/on cottonseed hulls (0.8 ppm).

The label directions (Dropp® 50WP, 45639-89) specify a maximum application rate of 0.3 lb. a.i./acre in two applications or a single application not exceeding 0.2 lb. a.i./acre. Thidiazuron is applied to mature cotton plants which are then generally harvested after a 5 to 30 day interval. There is a restriction on feeding foliage or gin trash to cattle. The following rotational crop restrictions apply:



Recycled/Recyclable
Printed with Soy/Canola Ink on paper that
contains at least 50% recycled fiber

Crop	Treatment to Planting Interval ¹
Small grain	2 weeks
Sorghum	2 weeks
Corn	2 weeks
Root crops (except carrots)	2 weeks
Legumes	2 months
Alfalfa	2 months
Leafy vegetables (except lettuce)	2 months
Lettuce	9 months
Carrots	9 months

¹ Do not use immature crops for food or feed.

The registrant has submitted a protocol for confined rotational crop studies, and this protocol is reviewed below.

Recommendation

The results of this studies may indicate a need for field rotational crop studies and/or rotational crop tolerances or modified plant-back restrictions. The registrant requested a time extension for completion of this study to December 1996. CBRS has no objections to the granting of this request. CBRS recognizes that the granting of time extensions is under the purview of SRRD. The registrant also stated that they would be willing to submit an interim report, if required. CBRS recommends that an interim report (following analysis of samples with the 120 day plant back interval) be submitted.

Conclusions

1. CBRS concludes that the position of the radiolabel is acceptable. The specific activity of the test material should be as high as possible to yield characterizable/identifiable levels of radioactivity in plant parts.

2.a. CBRS notes that previous reviews of confined rotational crop studies (A.Jones, 4/28/93, review of Study Nos. 00030793, 41364907, 41364908) indicated that the percent organic matter in soil should be < 1% to accurately reflect the soil in which cotton is typically grown. One of the reasons the aforementioned studies were considered inadequate was that the organic matter in the soil was too high (3.8%), resulting in possible binding of thidiazuron and thus limited availability to rotational crops in a manner which would not be observed in actual field use.

2.b. Starting on page 8 of the protocol, reference is made to application of radiolabeled and unlabeled buprofezin. CBRS assumes that this reference is a mistake that will be corrected

in the final protocol.

2.c. In addition to using the result from combustion analysis of filter papers placed on cotton foliage as an application rate check, samples of the spray solution should be analyzed by LSC.

3. CBRS concludes that the sampling scheme is adequate. The cotton crop will be sown in April 1994, test material applied in October 1994, and rotational crops planted at 14 (or 60), 120 and 365 days after treatment. Rotational crops will be harvested at crop maturity.

4. With regards to analysis of samples, CBRS notes that specific requirements for characterization/identification of residues are set forth in the documents entitled "Additional Guidance for Conducting Plant and Livestock Metabolism Studies" (7/16/92) and "Guidance on How to Conduct Studies on Rotational Crops" (2/23/93).

5. To determine storage stability, CBRS recommends that a representative of each sample type be analyzed within 1 month of harvest, not 4 months, and that results for these samples be compared to results for samples stored for the maximum storage intervals.

Detailed Considerations

Test Material

Thidiazuron labeled with ^{14}C in the C5 position of the thiadiazol ring, as shown in Figure 1, will be used. This material is currently being synthesized and all details concerning the source, lot number, specific activity and purity will be included in the study report. The radiolabeled material will be diluted with unlabeled test material. This unlabeled material is currently being re-ordered and details concerning source, lot number, and purity will be provided in the study report. Dropp 50 WP blank formulation equivalent will be used to formulate the final test material. Blank formulation and active ingredient will be milled together in an appropriate ratio to simulate the commercial formulation.

The registrant justified the position of the radiolabel by noting that in previous studies (soil and plant metabolism) using uniformly phenyl ring labeled material, cleavage of the urea bridge was not a primary route of soil metabolism. The registrant went on to state that in soil, metabolism of thidiazuron proceeds by "mineralization" of the phenyl ring to CO_2 .

Figure 1. Thidiazuron with position of ^{14}C radiolabel indicated.



CBRS concludes that the position of the radiolabel is acceptable. The specific activity of the test material should be as high as possible to yield characterizable/identifiable levels of radioactivity in plant parts.

Test System

The soil plots to be used in the study consist of 6 galvanized tanks (8 ft. x 3 ft. x 24 inches deep) that have been sunk into the ground to a depth of approximately 20 inches. Two tanks will be designated for each of the three soil ageing periods (immediate, seasonal, and annual rotations); one of the tanks will be treated and the other will serve as an untreated control. The tanks will be filled with soil (low organic matter) a 20 inch depth, the curved ends of the tank will be divided off thus delineating a 5 ft. x 3 ft. (1.39m²) area for treatment.

Cotton (source and variety to be provided) will be sown in the tanks at times appropriate to ensure that a full foliage canopy is present at the time when each tank is designated for treatment. The plot of mature cotton will be treated at a rate equivalent to 0.3 lb ai/A (the maximal rate). The exact quantities of radiolabeled and unlabeled material to be used will be determined when the specific activity of the radiolabeled thidiazuron is known. The test material will be freshly formulated for each application to a tank.

The test material will be sprayed onto the cotton foliage using a hand held pump action sprayer. Three filter papers will be placed on the cotton foliage prior to spraying and will be removed after the formulation is dry. Combustion analysis of the filter papers will serve as an application rate check.

The treated cotton plants will be allowed to defoliate and approximately 10 - 14 days post treatment the cotton will be harvested. The remaining foliage will be roughly chopped and incorporated into the top 4-5 inches of soil, to simulate plowing in the field.

Wheat, alfalfa, and cabbage will be used as the rotational crops. These rotational crops were chosen because they are the least sensitive crop of the main cotton rotational crop types, and therefore, could be planted back at the earliest plant back interval. The appropriate plot will be divided into thirds and each third will be allocated to one of the rotational crops. The immediate crop rotation plot will be sown with wheat 14 days post treatment, followed by alfalfa and cabbage 60 days post-treatment. The seasonal rotation plot will be sown with all crops after 120 days after treatment, and finally, the annual rotation plot after 365 days.

CBRS notes that previous reviews of confined rotational crop studies (A. Jones, 4/28/93, review of Study Nos. 00030793, 41364907, 41364908) indicated that the percent organic matter in soil should be < 1% to accurately reflect the soil in which cotton is typically grown. One of the reasons the aforementioned studies were considered inadequate was that the organic matter in the soil was too high (3.8%), resulting in possible binding of thidiazuron and thus limited availability to rotational crops in a manner which would not be observed in actual field use.

Starting on page 8 of the protocol, reference is made to application of radiolabeled and unlabeled buprofezin. CBRS assumes that this reference is a mistake.

In addition to using the result from combustion analysis of filter papers placed on cotton foliage as an application rate check, samples of the spray solution should be analyzed by LSC.

Sampling

Soil - Prior to treatment, a soil core sample will be taken from each plot for determination of soil type. The amount and nature of the residue in the soil will be determined at the beginning and end of the growth period of rotational crops in each tank.

Crops - Crops will be frozen on the day of harvest and stored frozen at - 20 C until analyzed. An immature harvest, corresponding to a forage stage, will be taken from the grain crop, even though current labels do not allow the feeding of immature crops. All crops will be harvested at maturity by cutting the plants at ground level.

The complete top-growth of cabbage will be analyzed undivided. The wheat grain will be analyzed separately from the combined husk and straw. Alfalfa will be separated into seed and foliage prior to analysis.

CBRS concludes that the sampling scheme is adequate.

Analysis

The frozen crop samples will be ground in a disc mill cooled with dry ice as soon as possible after harvest. Aliquots (6) will be combusted to determine TRR levels. Crops containing TRR at levels >0.010 ppm will be analyzed further by extraction using various solvents. Solvent extracts will be analyzed by LSC and remaining fiber combusted. Chromatographic techniques will be developed to characterize, and if possible identify, significant solubilized metabolites.

CBRS notes that specific requirements for characterization/identification of residues are set forth in the documents entitled "Additional Guidance for Conducting Plant and Livestock Metabolism Studies" (7/16/92) and "Guidance on How to Conduct Studies on Rotational Crops" (2/23/93).

Storage Stability

All samples and extracts will be stored frozen until analyzed. A representative of each sample type will be analyzed within 4 months of harvest to provide a comparison for samples stored for longer periods.

CBRS recommends that a representative of each sample type be analyzed within 1 month of harvest, not 4 months, and that results for these samples be compared to results for samples stored for the maximum storage intervals.

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