UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

DATE: May 10, 1979

SUBJECT: PP# 9F2172. Trifluralin (a,a,a-trifluoro-2,6-dinitro-N,N-dipropyl-p-toluidine) on barley and sorghum grains and a request for a grain crop group tolerance. Evaluation of analytical method and residue data.

FROM: P. V. Errico, Chemist, Residue Chemistry Branch, HED (TS-769)

TO: P.M. #23, Willa Garner, Herbicide-Fungicides Branch (TS-767)

THRU: Acting Chief, Residue Chemistry Branch

Elanco Products Co., A Division of Eli Lilly and Co., has requested a 0.05 ppm tolerance for the herbicide trifluralin (Treflan) in or on barley and sorghum grain. In light of the established and proposed trifluralin tolerances for grains, the petitioner requests that the grain tolerances be expanded to cover the grain crop commodity group.

Treflan has established tolerances of 0.05 ppm to 2 ppm on a number of commodities. There is a 0.05 ppm tolerance on field corn grain and wheat grain.

Conclusions

1. The residue of concern is the parent compound, trifluralin.

2. Adequate analytical methods are available for enforcement of the requested tolerances.

3a) A tolerance for barley straw is needed. In addition, either a tolerance is necessary for barley forage and fodder, or else an animal feeding restriction for these commodities must be on the label. The submitted residue data will support a 0.05 ppm tolerance for barley, straw, forage and fodder.

3b) Tolerances should be proposed for sorghum grain (sweet sorghum forage and fodder are excluded) forage and fodder; alternatively, an animal feeding restriction for these commodities on the label will be necessary. A 0.05 ppm tolerance would be adequate for these commodities.

3c) The residue data support the proposed 0.05 ppm tolerance in or on barley and sorghum grains. The label proposes use on grain sorghum.

3d) Residue data from field corn, wheat, barley, and sorghum grains support a tolerance for the grain crop commodity group, with sweet corn and rice grains excepted. A 0.05 ppm tolerance can be established.

4) For the proposed use, milk, eggs, meat, and/or poultry fall into Section 180.6(a) category 3.

Recommendations

1. For a favorable recommendation we will need the following:

a. A barley straw tolerance should be proposed. Furthermore, either an animal feeding restriction or a tolerance request for barley forage, and fodder is needed. A tolerance of 0.05 ppm would be satisfactory.

b. For sorghum forage and fodder, either an animal feeding restriction, or a tolerance request is necessary. A tolerance request of 0.05 ppm would be satisfactory.

2. The grain crop commodity group tolerance of 0.05 ppm should read: Grain crops (except fresh sweet corn, and rice grain) at 0.05 ppm.

3. The petitioner must submit a section B delineating the changes stated in Conclusions 3 (a) (b). The petitioner should be advised that if a use on sweet sorghum is ever proposed, supporting residue data will be needed.

DETAILED CONSIDERATIONS

Proposed Use

Barley: Treflan is to be applied as soon as possible after seeding and before crop emerges. Shallow incorporate herbicide in two different directions 1 to 1½ inches deep.

Sorghum grain (milo): Apply Treflan when crop is well established and is no less than 8 inches tall. Treflan can be applied as an overtop or directed spray, and drop nozzles should be used if sorghum foliage prevents uniform coverage of the soil surface.

Apply Treflan to barley or sorghum at the following broadcast rates based on active ingredient per acre:

Soil Texture	Lb a.i./A Sorghum	Barley
Coarse (sand, loamy sand, sandy loam)	0.38 to 0.5	0.5
Medium (loam, silt loam, silt, sandy clay loam, silty clay loam)	0.5 to 0.75	0.5
Fine (clay, clay loam, silty clay, sandy clay, sandy clay loam, silty clay loam)	0.75 to 1	0.75

Inert Ingredients

The inert ingredients in the formulation are cleared for use under Sec. 180.1001.

Nature of the Residue

The metabolism of trifluralin in plants and animals have been adequately discussed in previous reviews by T. Woodward (PP# 7G0533, 10/31/66), R. Arnold and J. Wolff (PP# 7F0555, 5/24/67), R. Beyak (PP# 4E1509, 10/17/74, and A. Smith (PP# 9F0851, 9/9/69).

In summary, trifluralin is absorbed and translocated in plants. Using radioactive tracer studies ($^{14}CF_3$) on carrots, peanuts, soybeans, sweet potatoes and cotton, it was indicated that degradation includes a stepwise dealkylation of the aniline group, reduction of the nitro groups, and, to a lesser extent, carboxylation of the trifluoromethyl group.

Radiometric assays of milk and tissues from a lactating cow and goat (memo by J. Wolff, PP# 7F0565, 5/29/67) indicated no residues (<0.01 ppm) in milk samples or goat tissues. In the cow study no residue (<0.01 ppm) of trifluralin was found in lean meat, heart, liver and kidney, while trace residues of 0.03-0.04 ppm were found in fat and lung tissue. Additional animal feeding studies also indicated that trifluralin is rapidly metabolized and excreted, with no significant storage of residues.

No metabolism studies were submitted for barley or sorghum, but we believe the above studies are adequate to consider the metabolism of trifluralin in plants and animals adequately delineated.

Analytical Method

The method used in this petition is similar to the enforcement method in PAM II. In some instances, the gas chromatographic step was carried out using a Carbowax 20M monomolecular layer phase prepared as described by Aue, W. A., et. al., Anal. Chem., 45 725 (1973).

A 25 g sample is blended for 5 minutes in 200 ml of methanol, filtered through Whitman #1 filter, then partitioned with 500 ml of a 5% sodium chloride solution and 50 ml of methylene chloride. The partitioning is repeated twice, then the methylene chloride is drained through sodium sulfate. The methylene chloride is evaporated on a 50°C water bath, the residue is dissolved in 5 ml of n-hexane, and the solution transferred to a Florisil column for fractionation. After the residue fraction was collected, it was evaporated to dryness and redissolved in 2 ml of benzene. The quantity of parent compound was determined using gas chromatography with an electron capture detector.

For crops containing interfering BHC, Ethion and/or Zineb, a thin layer chromatography method is available for initial cleanup. Sensitivity of the method is 0.01 ppm.

The eluant from the thin layer chromatography cleanup is then assayed using gas chromatography.

Residue Data

Residue data were submitted with this petition for barley and sorghum.

For barley, whole plant, mature grain and straw were sampled 56 to 103 days after treatment. The soil was incorporated with 0.5 lb a.i./A to 2.0 lb a.i./A. Detectable residues of the parent, trifluralin, were found in straw only (0.04 ppm). Residue values for straw were reported from four studies; two studies reported 0.01 ppm and two studies reported 0.04 ppm. These values were not corrected for untreated controls. Untreated controls gave values of 0.01-0.02 ppm trifluralin. A telephone conversation with Ralph Hill, 3/30/79, indicated that the untreated control straw samples were probably contaminated with trifluralin.

Sorghum samples assayed included mature grain, plant leaves, and seed heads. Sampling occurred 41 to 103 days after treatment with 0.5 lb a.i./A to 2.0 lb a.i./A. The majority of samples gave NDR. The maximum residues reported for mature grain, plant leaves and seed heads were 0.031 ppm, 0.013 and 0.012 ppm. An untreated grain control reportedly contaminated (telephone conversation with Ralph Hill 3/30/79) with trifluralin, gave a parent residue value of 0.013 ppm.

A tolerance proposal for trifluralin in/on sorghum forage and fodder is necessary. Otherwise, the petitioner must impose an animal feeding restriction for these commodities. Analysis of sorghum plant leaves gave a maximum trifluralin residue of 0.013 ppm. There is sufficient residue data to support a tolerance proposal of 0.05 ppm for sorghum forage and fodder.

Tolerance proposals are needed for barley fodder, forage and straw. Otherwise, the petitioner must impose an animal feeding restriction for forage and fodder. For barley straw, a tolerance will be necessary.

No data has been submitted for any grain hay. There is presently an established tolerance of 0.05 ppm in/on peppermint hay and spearmint hay, and 0.2 ppm in/on alfalfa hay. But because no detectable residue was reported in the whole plant 56 days after treatment, and there is a 3.6 concentration factor for succulent forage to dried hay, residues are not expected to exceed 0.05 ppm.

There is presently an established tolerance of 0.05 ppm on wheat grain and straw, and on field corn grain, fodder and forage. This petition presents satisfactory residue data to support a tolerance of 0.05 ppm on sorghum and barley grain. This conclusion is not applicable to sweet sorghum. Residue data for sweet sorghum and sorghum syrup will be needed to support any use proposal for sweet sorghum.

With the established grain tolerances and additional information stated above, the petitioner requests a tolerance on the grain crop grouping of 0.05 ppm. It is our opinion that the data support a grain crop grouping tolerance of 0.05 ppm, with the exception of rice grain and sweet corn. Cultural practice differences preclude the addition of rice, and additional residue data will be required for early maturing varieties of sweet corn.

Meat, Milk, Poultry and Eggs

As discussed by J. Wolff (PP# 7F0565, 5/29/67), a feeding diet for cows and goats containing up to 10 ppm trifluralin resulted in no detectable residues in meat and milk (<0.01 ppm). We would conclude, therefore, that feeding barley grain, fodder, forage or hay, and sorghum grain, fodder and forage would not lead to trifluralin residues in meat and milk. We then further conclude that milk, eggs, meat, and/or poultry, for the proposed use, is a section 180.6(a) category 3 situation.

P. V. Errico