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To: R. Mountfort
Product Manager 23
Registration Division (TS-767)

From: Carolyn K. Offutt Carolyn Offutt
Chief, Environmental Processes and Guidelines Section
Exposure Assessment Branch, HED (TS-769)

Attached, please find the environmental fate review of:

Reg./File No.: 1471-EUP-ON

Chemical: trifluralin

Type Product: herbicide

Product Name: Treflan

Company Name: Elanco

Submission Purposes: Review new application method in terms of potential to leach to ground water

ZBB Code:

Action Code: 760

Date In: 3/15/85

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22	1

Deferrals To:

_____ Ecological Effects Branch

_____ Residue Chemistry Branch

_____ Toxicology Branch

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REVIEW OF CHEMIGATION AND LEACHING

POTENTIAL OF TRIFLURALIN

1. CHEMICAL:

Chemical name: Trifluralin
Common name: Treflan

2. TEST MATERIAL:

Treflan® EC, Treflan® MTF, and Treflan® 5

3. STUDY/ACTION TYPE:

Registrant requested an EUP for chemigation application of Treflan on alfalfa to evaluate control of various grasses. The question arose as to whether this method of application would lead to ground water contamination

4. STUDY IDENTIFICATION:

Title: Application for Experimental Use Permit Alfalfa
Author: Elanco Products Co, a division of Eli Lilly and Co.
Report No: 1471-EUP-ON
Submitted by: Elanco Products Co
Issue Date: 12/6/84
Accession No: 256131

5. REVIEWED BY:

Matthew N. Lorber, Agricultural Engineer
Environmental Processes and Guidelines Section/EAB/HED

6. APPROVED BY:

Carolyn K. Offutt, Chief
Environmental Processes and Guidelines Section/EAB/HED

7. CONCLUSIONS:

Treflan will most likely not leach to ground water, regardless of the method of application. It is in a class of immobile chemicals, with an octanol-water partition coefficient of 118,000 - which translates to an overall soil K_d of greater than 80 even in sandy leaching soils. Applying Treflan in irrigation water will enhance the disappearance of Treflan because Treflan has been shown to volatilize, and volatilization increases in moist conditions.

8. RECOMMENDATIONS:

The EUP for chemigation of Treflan on alfalfa should not be

withheld because of a concern for contamination of ground water. Chemigation will not increase ground water contamination as long as proper precautions, particularly anti-siphoning and check valves, are taken.

9. BACKGROUND:

A. Introduction

Proposed use is only at an application site of a cooperator and in accordance with the terms and conditions of the EUP. A prior EUP was granted for treflan application to sugarbeets via center pivot irrigations in 1976 (file # 476-EUP-85).

B. Directions for Use

Treflan may be applied through center pivot or lateral-move overhead sprinkler irrigation systems equipped for chemigation. Applications should be at recommended rates and in one-half to one inch of water. Applications may begin in the fall, and in the spring to dormant alfalfa, established alfalfa, or after an alfalfa cutting. Proper precautions, particularly anti-siphoning and check valves in the irrigation system, must be taken.

10. DISCUSSION OF INDIVIDUAL TESTS OR STUDIES:

See attached April 16, 1985, review.

April 16, 1985

Title: Evaluation of leaching potential of trifluralin when applied in irrigation water via chemigation

There is a very low probability that trifluralin will leach to ground water, regardless of the method of application. The octanol water partition coefficient, K_{ow}, of trifluralin is 118,000. Using two methods of estimation (Lyman, et. al, 1980), the organic matter partition coefficient, K_{om}, is estimated to be between 7900 and 32,000. Assuming a sandy soil conducive to leaching (1% organic matter), the overall partition coefficient, K_d, would be between 80 and 320, which still would result in tight binding of trifluralin to the sandy soil, and no leaching.

This conclusion is supported by registrant and literature studies on trifluralin. Helling, et al (1971, Soil Sci. Soc. Amer. Proc., vol 35, p. 737) places trifluralin in mobility class I, which is a class of immobile chemicals. The registrant conducted a column leaching study on Princeton fine sand and Brookston silty clay loam (Ref. #35,36 Eli Lilly). No leaching was observed on the clay loam and trifluralin had only moved 2-4 inches when 10 inches of water was leached through the column containing the sand soil. In another literature study (Ref. #10, Weed Science), trifluralin was incorporated to depths of 2.5 and 7.5 cm in fields planted to carrots for three consecutive years. Trifluralin residues were only found at the depth of incorporation.

Not only will trifluralin not leach in general, applying it through irrigation water will result in less leaching than the two other methods of application, which are EC and granular formulations. The reason for this is that trifluralin is subject to volatilization and photolysis under proper conditions. In general, volatilization will increase under moist conditions, and irrigation will not only moisten the soil, but bring the soil to field capacity and possibly saturation. Parochetti and Hein (1973, Weed Science, vol. 21, p. 469) showed that the volatility of trifluralin increased significantly as moisture increased to field capacity, and increased further at soil saturation. Granular pesticide volatized much slower over the range of soil moisture. Spencer and Claith (1974, J. Agr. Food Chem., vol 22, p. 987) showed that application to dry soil resulted in esentially no volatilization. They also showed that trifluralin volatilized more rapidly when surface applied than when incorporated. Probst, et al (1967, J. Agr. and Food Chemic, vol. 27) showed that the half-life on flooded soil was 10 days, while on moist soil it was well over 40 days. Typical field half-lives reported are in the range of 3-6 months, indicating that moist conditions do increase the volatile loss of trifluralin. Granular incorporated or injected applictions will decay less because

trifluralin also has shown to be susceptible to photolysis. Several studies outlined in EAB's file indicate photolysis under laboratory conditions, with significant loss of parent compound within hours. Soderquist, et al (1975, Agr. Food Chem., vol 23, p. 304) studied photolysis of trifluralin in laboratory and field conditions, and found that under field conditions, photolysis of trifluralin occurs on the soil surface within a day of application, followed by volatilization.

For the reasons stated above - tight adsorption of trifluralin and enhanced decay due to moist conditions (volatilization) and surface application (photolysis) - trifluralin will almost definitely not leach when applied with irrigation water. The concern is valid, however, since it has been shown that irrigation will enhance the leaching of pesticides by moving them through the soil in much the same way that rainfall does. However, this is only an issue with soluble pesticides.

It is noted that an EUP was granted for trifluralin application to sugarbeets via center pivot irrigations in 1976 (file # 476-EUP-85). Similar to that EUP in 1976, the major concern with application through irrigation systems is the potential contamination of the water source through back siphoning. The precaution for this EUP which begins "Apply the product only through irrigation systems containing anti-siphon and check valves..." should be well heeded. Contamination of ground water could occur if irrigation is drawn directly from a well and these cautions are not taken, resulting in back siphoning.

Matthew Lorber

Matthew Lorber, Agricultural Engineer
Environmental Processes and Guidelines Section/EAB/HED