11-14-78

DATE: 11/14/78

To: Product Manager Garner (23)
TS-767

Through: Dr. Gunter Zweig, Chief
Environmental Fate Branch

From: Review Section No. 1
Environmental Fate Branch

Attached please find the environmental fate review of:

Reg./File No.: 2139-EUP-23, 6G1807

Chemical: N-phenyl-N'-1,2,3-thiadiazol-5-ylurea (SN-49537, thidiazuron)

Type Product: defoliant

Product Name: DROPP

Company Name: NOR-AM

Submission Purpose: Use on cotton

Date in: 10/24/78

Date out: 11/14/78

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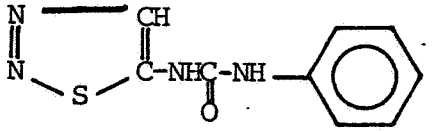
1. Introduction

1.1 Structure



Also called Thidiazuron, DROPP, SN-49537

1.2 This is not an extension for a non-food crop as Non-AM may have one believe. It is an extension from non-food (cotton grown for seed only) to food crop, cotton. Most crops grown for seed are not usually rotated so we now have a major item to consider when we did not before.

1.3 The permit is for use in 9 states on 750 acres. About 300 lbs Dropp will be shipped. Non-AM also states that plots are 10 acres.

2. Directions for use (cotton defoliant) Apply 0.1 - 0.6 lbs/A (0.05 - 0.3 lb ai/A) in 10 - 25 g/A by ground and in 5 - 10 g/A by Air.

Apply to mature cotton plants when 70% or more of the balls are open. Apply at least 14 days prior to hand picking.

Do not feed foliage from treated cotton plants or gin trash to livestock.

Keep out of lakes, streams and ponds.

Do not contaminate water by cleaning of equipment ~~at~~ or disposal of waste.

3. Discussion of Data

3.1 Rotational Plant Uptake Study with Radioactive SN 49537, final report, August 10, 1978

Note: The progress report of this study was reviewed in our evaluation of 2139-EUP-23 dated June 5, 1978.

A dry loamy sand (88.2% sand, 5.5% silt, 6.3% clay, 2.0% OM, pH = 6.6/$CaCl_2$, exchange cap. = 7.5 mVal/100 g, water cap. = 40 g H_2O/100 g soil) was fortified to 0.2 ppm with either ^{14}C-phenyl- or 5-^{14}C-1,2,3-thiadiazolyl-thidiazuron (DROPP or SN49537), placed in 10 l buckets and moistened. Soybeans, sugarbeets and sorghum were planted in the soil after aging periods of 14 days and 6 months. Control plants were grown in untreated soil.

Crop samples were taken at 1/4 and 1/2 maturity and analyzed in 3 parts; (1) leaves and stems, (2) roots and (3) fruiting parts.

Only the crops grown in the 14 day aged soil and harvested before maturity were extracted with solvents which were measured for ^{14}C activity content in addition to combustion for determination of non-extractable residues. All other plant analyses were done by combustion only, since very small ^{14}C levels were expected.

Soil samples were assayed for ^{14}C content immediately after treatment, at planting and at the time of plant sampling by extracting 3X with dioxane or toluene, 3X with methanol followed by a 24 hour soxhlet extraction with methanol and assaysing of the solvents by LSC. The extracted soil was then seperated into humic and fulvic acids and insoluble material which were analyzed for ^{14}C content.

Results

Residues in soybeans planted after 2 weeks of soil aging of 0.2 ppm thidiazuron

label	harvested, wks after planting	residues found in soybeans, ppm			residues found in soil, ppm		
		leaves & stems	fruit	roots	extractable	fulvic & humic	combustion
P*	6	.02-.03	.04	.05-.09	.058-.071	.060-.067	.045-.056
	12	.03-.04	<.01	<.01	.056-.060	.049-.051	.067-.069
	24	0.01	.01-.03	.05	.020-.026	.034-.048	.068-.090
T*	6	.03-.04	.13-.16	.06-.07	.055-.078	.038-.039	.045-.047
	12	.03-.06	<.01	<.01	.056-.067	.050	.041-.047
	24	.02-.04	.02	.11	.026-.031	.040-.051	.045-.063

Residues in soybeans planted after 6 months of soil aging of 0.2 ppm thidiazuron

P*	6	<.01	--	.02	.012-.016	ND	.055-.056
	12	<.01	<.01	<.01	.023-.028	.038-.043	.055-.093
	24	<.01	.02-.05	.02-.03	.002-.003	NA	.101-.122
T*	6	.01	--	.01	.028-.029	.067-.085	.032-.050
	12	.01	<.01	.01	.028-.031	.051-.084	.025-.056
	24	.01-.04	.03-.07	.01-.04	.007-.020	NA	.100-.106

Residues in sugarbeets planted after 2 weeks of soil aging of 0.2 ppm thidiazuron

label	harvested, wks after planting	residues found in sugarbeets, ppm: aerial parts	beets	residues found in soil, ppm: extractable	fulvic & humic	combustion
P*	6	.02	.03-.07	.074-.085	.037-.041	.053-.063
	12	<.01	.03	.043-.044	.051-.054	.057-.067
	24	<.01	<.01	.012-.049	.053-.056	.070-.089
T*	6	.01	.04-.05	.052-.061	.045-.051	.049-.053
	12	<.01	<.01	.045-.048	.057-.058	.047-.052
	24	<.01	<.01	.022-.030	NA	.110-.112

Residues in sugarbeets planted after 6 months of soil aging of 0.2 ppm thidiazuron

P*	6	<.01	<.01	.012-.034	.064-.070	.057-.076
	12	<.01	<.01	.031-.046	.142-.150	.030-.034
	24	<.01	<.01	.012-.030	NA	.101-.131
T*	6	<.01	<.01	.032-.041	.030-.032	.090-.105
	12	<.01	<.01	.029-.031	.086-.115	.028-.030
	24	.01	<.01	NA	NA	NA

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Residues in sorghum planted after 2 weeks of soil aging of 0.2 ppm thidiazuron

label	harvested, wks after planting	residues found in sorghum, ppm: leaves & stems	fruit	roots	residues found in soil, ppm: extractable	fulvic & humic	combustion
P*	6	.01	--	.04	.076-.089	.042	.058-.071
	12	<.01	--	.03	.044-.050	.058-.081	.060-.067
	24	<.01	<.01	.01-.02	.008-.014	.033-.040	.064-.086
T*	6	.01	--	.03-.09	.057-.068	.040-.043	.045-.048
	12	<.01	--	.02-.03	.049-.056	.049-.064	.050-.051
	24	.01	.01	.01-.02	.021-.029	NA	.078-.099

Residues in sorghum planted after 6 months of soil aging of 0.2 ppm thidiazuron

P*	6	<.01	--	<.01	.012	.063-.074	.078-.094
	12	<.01	<.01	<.01	.021-.025	.088-.163	.025-.037
	24	.01	.09-.13	.01-.02	.007-.014	.031-.052	.064-.069
T*	6	<.01	--	.02-.03	.019-.025	.029-.036	.037-.092
	12	<.01	<.01	.01	.020-.039	.097-.109	.022-.024
	24	.01-.03	.05-.09	.01-.03	.020-.021	NA	.053-.082

Symbols and abbreviations

P* - [UL - ^{14}C] - phenyl-thidiazuron

T* - [5 - ^{14}C] - thiadiazolyl-thidiazuron

ND - not detected

NA - not analyzed

Conclusions

1) The level of uptake of ^{14}C residues is the same for both radiolabeled species (P* and T*) of thidiazuron.

2) Because of the low level of ^{14}C thidiazuron applied and aged in the soil (0.2 ppm ai) and the subsequent plant uptake values of mostly below 0.05 ppm total ^{14}C, characterization and identification of plant metabolites was not done. Studies run at higher soil fortification levels, if not phytotoxic, may have permitted characterization of ^{14}C plant metabolites.

3) Aerobic soil metabolism data previously reviewed (see evaluation 2139-EUP-22 dated August 9, 1976) showed thidiazuron to have a soil halflife of 3-4 months with bound residues reaching 40% of the applied at 3 months when using ^{14}C-phenyl labeled thidiazuron. (Data on the soil fate of the thiadiazolyl moiety of the parent has not been submitted). Also, a previously reviewed, non-radiolabeled rotational crop study (see evaluation 2139-EUP-23 dated August 5, 1977) showed no detectable uptake of aniline containing residues when the crops were planted 10 weeks after treatment with 2 lb ai/A. This information shows (1) at 10 weeks there would be aniline containing material in the soil since the halflife is 3-4 months and (2) the aniline containing material is not being taken up or is being taken up but is altered to a non-aniline function within the plant.

4) Rotational soybeans contain <0.01-0.16 ppm residues when harvested between 1/4 and full maturity with the highest values found in the fruit and roots. When planted 6 months after application, residues do not exceed 0.07 ppm. Identity or character of the residues is not addressed.

5) Rotational sugarbeets planted 2 weeks - 6 months after treatment contain <0.01-0.01 ppm residues at maturity with residue values as high as 0.07 ppm when harvested between 1/4 and 1/2 maturity. Identity or character of the residues is not addressed.

6) Rotational sorghum planted 2 weeks - 6 months after treatment contains <0.01-0.13 ppm residues between 1/4 and full maturity, with values higher than 0.03 ppm occurring only in the fruit and roots. Identity and character of the residues is not addressed.

4.0 RECOMMENDATIONS

4.1 Unidentified, uncharacterized ^{14}C-residues are found in rotational soybeans, sugarbeets and sorghum when planted between 2 weeks and 6 months after treatment. A previously reviewed non-radiolabeled rotational crop study showed no uptake of aniline containing residues only, but did not address uptake of other moieties.

4.2 We cannot recommend a change in the current 12 months rotational crop interval until uptake of non-aniline containing residues by rotational crops is addressed. Information on whether the residues can be characterized as plant conjugated, incorporated in the plant structure or if the residues consist of so many different products at low levels that identification and/or characterization is not possible, is needed.

Samuel M. Creeger Nov. 21, 1978

Samuel M. Creeger
November 9, 1978
Review Section #1
Environmental Fate Branch
Hazard Evaluation Division