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WASHINGTON, D.C. 20460

JUN 8 1994

June 6, 1994

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: Metribuzin Terrestrial Plant Data Evaluation Record
(D203304)

TO: Walter Waldrop, PM 71
Special Review and Reregistration Division (7508W)

FROM: *for* Anthony F. Maciorowski, Chief *Douglas J. Urban*
Ecological Effects Branch
Environmental Fate and Effects Division (7507C) *6/8/94*

Miles, Inc., has submitted a seed germination and seedling emergence study (MRID #432083-01) in support of reregistration of metribuzin. The seedling emergence study was a repeat of an earlier submission which was found to be invalid for cotton. The studies have been reviewed and are classified as core, fulfilling Guideline 123-1a.

The following data requirements are **outstanding** for metribuzin:

- 71-4: Avian reproduction, gamebird and waterfowl (TGAI)
- 72-4a: Fish early life stage (TGAI)
- 123-2: Tier II aquatic plant testing (TGAI)

The following data requirements are **reserved** for metribuzin:

- 72-5: Fish life cycle (TGAI)
- 72-6: Aquatic organisms accumulation (TGAI)

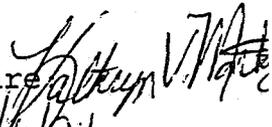
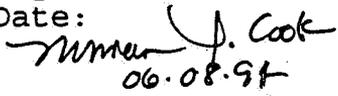
If you have any questions on the above, please contact Kathryn Valente Montague (308-2804).



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Data Evaluation Record

1. Chemical: Metribuzin, Shaughnessy No.:101101
2. Test Material: Metribuzin technical, 94.1% a.i., Batch #0145346
3. Study type: Tier II Seed Germination/Seedling Emergence (123-1)
Test Species: 10 species of monocotyledonous and dicotyledonous terrestrial plants (seed germination), cotton (Gossypium hirsutum) only for seedling emergence.
4. Study ID: Johns, C.L. 1994. "Tier II Seed Germination and Seedling Emergence Nontarget Phytotoxicity Using Metribuzin. Performed by Miles Inc., Agriculture Division, Research and Development Department, Early Development Group, 17745 South Metcalf, Stilwell, Kansas 66085-9104, for Miles Incorporated, Agriculture Division, Box 4913, 8400 Hawthorn Road, Kansas City, MO. Report #106568. MRID #432083-01.
5. Reviewed by: Kathryn Valente Montague, M.S.
Biologist
EEB/EFED
Signature: 
Date: 6/6/94
6. Approved by: Norm Cook
Head, Section II
EEB/EFED
Signature: 
Date: 06.08.94
7. Conclusions: Both studies are scientifically sound and are classified as core, fulfilling Guideline 123-1a. For seed germination, there was no effect on percent germination for any of the species tested. In the seedling emergence study on cotton, phytotoxicity appeared at levels as low as 0.0281 lb a.i./A, making the NOEC for this parameter 0.0141 lb a.i./A, which is the lowest NOEC for that study. Height and dry weight were the next most sensitive parameters, with NOECs of 0.0281 lb a.i./A for both, EC₂₅s of 0.0635 and 0.0423, respectively, and EC₅₀s of 0.1199 and 0.0650 lb a.i./A, respectively. For percent survival, the NOEC was 0.056, the EC₂₅ was 0.0717 and the EC₅₀ was 0.1042 lb a.i./A. There were no effects on percent emergence seen in this study.
8. Recommendations: N/A
9. Background information: These studies were submitted in support of reregistration of metribuzin; the cotton seedling emergence study was a repeat of a previously submitted study

which was found to be invalid for cotton.

10. Discussion of Individual Tests: N/A

11. Materials and Methods:

a. Test plants: The source and cultivar of the plant species used in the seed germination test are as follows:

TABLE 1: Source and cultivar of plant materials used in this test.

Common name	Scient. name	Family	cultivar	source
Cotton	<u>Gossypium hirsutum</u>	Malvaceae	Delta Pine	Farmers Union Coop
Corn	<u>Zea mays</u>	Gramineae	Iochief	Planters Seed
Cucumber	<u>Cucumis sativus</u>	Cucurbitaceae	Straight 8	Planters Seed
Grain Sorghum	<u>Sorghum vulgare</u>	Gramineae	Pioneer 8500	Farmers Union Coop
Wheat	<u>Triticum aestivum</u>	Gramineae	T-Bird	Farmers Union Coop
Onion	<u>Allium cepa</u>	Liliaceae	Bermuda White	Planters Seed
Turnip	<u>Brassica napus</u>	Cruciferae	Purple Top	Planters Seed
Pea	<u>Pisum sativum</u>	Leguminosae	Little Marvel	Planters Seed
Soybean	<u>Glycine max</u>	Leguminosae	Williams 82	Farmers Union Coop
Tomato	<u>Lycopersicon esculentum</u>	Solanaceae	Beefstake	Planters Seed

b. Test conditions: For seed germination, 10.0 mL of each test solution was pipetted onto filter paper in a petri dish. The dishes were allowed to dry for about 1 hour so that the methanol would evaporate. Ten seeds of a particular species were placed on the paper, with 4 dishes of each species per treatment group. Methanol and deionized water in a 90:10 ratio was used as a solvent, and a solvent control was

included in the study. The dishes were placed in a growth chamber and held at 25°C with 60-70% relative humidity in continuous darkness for 6 days. Observations for germination were then made.

For seedling emergence, cotton seeds were planted 5 mm deep in 10.5 x 9.5 cm plastic pots containing pasteurized loam soil with an organic material content of 3.15% to 7.5 cm of the pot rim. There were 10 seeds/pot and 4 pots per treatment group. A solvent control of methanol/deionized water in a 95:5 ratio was used. Pots were hand watered until germination, and were then watered daily with a pic line irrigation system, which provided 40 mL water/pot/day. Shortly after planting, the pots were sprayed with the appropriate test solution at a rate equivalent to a field rate of 35 gal/acre. The spray was applied with overhead nozzles 13.5 inches above the surface in a 22.7 inch band width at 20 psi. After spraying, the pans were placed in a greenhouse with an average temperature of 25°C and an average relative humidity of 60%. The photoperiod was 9:38 hours light at the beginning of the test period and 10:11 hours light at the end. Observations for emergence and phytotoxic effects were made at 10, 14 and 21 days. Phytotoxicity was scored on the following scale: 0% = no effects; 20% = slight or restorable effects to one area of the plant; 40% = moderate effects involving the whole plant (e.g., mild stunting, chlorosis); 60% = severe effects with recovery possible (e.g., severe leaf dessication); 80% = total plant effect (e.g., very poor vigor); 100% = plant death. On the twenty-first day, all above-ground parts were harvested, measured, dried and weighed.

c. Study design: Seed Germination: There were 4 replicates of each species per treatment, with each replicate containing 10 seeds. There were 3 treatment levels tested: 12 ppm, 6 ppm and 3 ppm plus a solvent and negative control. Seedling emergence: treatment levels used in the seedling emergence portion were: 0.0035, 0.0070, 0.0141, 0.0281, 0.0563, 0.1125, and 0.225 lb a.i./acre.

d. Statistics: Seed Germination: ANOVA with Dunnett's mean separation was used to compare the number of seeds germinated at the end of the 6 day test period. Seedling Emergence: The NOEL, EC₂₅ and EC₅₀ were calculated for percent germination, percent emergence, phytotoxicity, height and dry weight. ANOVA with Dunnetts was used for effects other than phytotoxicity; phytotoxicity was compared using Duncan's Multiple Range test.

12. Reported Results: **Seed germination:** There were no adverse effects on seed germination for any species at any of the levels tested.
Seedling emergence: Emergence began at 9-10 days after

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treatment. There were no significant differences in percent emergence between the treatments and controls on day 10 or day 14. Phytotoxicity: none at day 10; on day 14, there was significant injury at the three highest levels tested (stunting and chlorosis); these effects were still present on day 21. Percent survival: There was a significant difference between the two highest rates and the controls on day 21. NOEC=0.056 lb a.i./A, EC₂₅=0.0717 lb a.i./A, and EC₅₀=0.1042 lb a.i./A. Height: Significant difference between the three highest rates and the controls. NOEC=0.0281 lb a.i./A, EC₂₅=0.0635 lb a.i./A, EC₅₀=0.1199 lb a.i./A. Dry weight: Significant difference between the three highest rates and the controls. NOEC=0.0281 lb a.i./A, EC₂₅=0.0423 lb a.i./A, EC₅₀=0.0650 lb a.i./A.

13. Study Author's Conclusions/Quality Assurance Report: Metribuzin caused no adverse effects on seed germination in any of the species tested at rates up to 12 ppm. NOECs and EC values for cotton seedling emergence are given above.

Quality Assurance and Good Laboratory Practice statements were included in the report.

14. Reviewer's Discussion and Interpretation of the Results:
- a. Test Procedure: The test design and procedure were in accordance with protocols recommended by the Guidelines.
 - b. Statistical Analysis: The statistical calculations were verified using the Toxstat computer program. Effects were compared using Dunnetts for data that met the assumptions of ANOVA, and Williams test for nonparametric data. Results were found to be in accordance with the reported results with the exception of the phytotoxicity data; this data required nonparametric analysis, and Williams test showed a significant difference between the four highest treatments and the controls, where the study author reported a significant difference only at the three highest rates.
 - c. Discussion/Results: The study is scientifically sound and in accordance with the Guidelines.
 - d. Adequacy of the study:
 - (1) Classification: Core.
 - (2) Rationale: N/A.
 - (3) Repairability: N/A

July copy.
Metribuzin

Generic Data Requirements for Metribuzin as of 6/6/94

Data Requirement	Composition	Use Pattern ¹	Does EPA Have Data to Satisfy Data Req.	Citation	More Data Submitted Under FIFRA 3(c)(2)(B)?
158.490 Wildlife and Aquatic Organisms					
AVIAN AND MAMMALIAN TESTING					
71-1 Avian oral LD ₅₀	TGAI	A, B	Yes	GS0181-009	No
71-2 Avian dietary LC ₅₀					
a: upland gamebird	TGAI	A, B	Yes	00065507	No
b: waterfowl	TGAI	A, B	Yes	00065507	No
71-3 Wild Mammal Toxicity	TGAI		No		No
71-4 Avian Reproduction (Gamebird and waterfowl)	TGAI		No		Yes ²
71-5 Simulated and actual field testing-mammals and birds	TEP		Partially	00035931	No
AQUATIC ORGANISM TESTING					
72-1 Freshwater fish LC ₅₀					
a. Warmwater	TGAI	A, B	Yes	400980-01	No
b. Warmwater	TEP		Yes		No
c. Coldwater	TGAI	A, B	Yes	400980-01	No
d. Coldwater	TEP		Yes		No

¹B=Terrestrial feed, D=Aquatic food, G=Aquatic nonfood, H=Greenhouse food crop

²Required due to persistence in the environment and repeat applications.

Item	Category	Yes	No	Other	Notes
72-2	Freshwater Invertebrate EC ₅₀	Yes	No	072083	
72-3	Marine/Estuarine Acute LC ₅₀	Yes	No	420945-02	
	fish TGAI	Yes	No	420945-01	
	mollusk TGAI	Yes	No	00106197	
	shrimp TGAI	Yes	No		
72-4	a. Fish early life stage (TGAI)	Yes	No	424478-01	
	b. Aquatic invertebrate life cycle (TGAI)	Yes	No	427312-01	
72-5	Fish Life Cycle	No	Reserved ⁴		
72-6	Aquatic organism accumulation	No	Reserved		
72-7	Simulated or actual field testing - aquatic organisms	No	No		
158.150	PLANT PROTECTION				
121-1	Target area phytotoxicity	No	No		
	Nontarget Area Phytotoxicity TIER I				
122-1	Seed germ./ seedling emergence	No	No		
122-1	Vegetative vigor	No	No		
122-2	Aquatic plant growth	No	No		

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³Previously submitted studies are supplemental and must be repeated.

⁴Reserved pending results of fish early life stage testing.

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TIER II					
123-1	Seed germ./ seedling emergence	TGAI	A, B	Yes 424478-03, 432083-01	No
123-1	Vegetative vigor	TGAI	A, B	Yes 424478-03	No
123-2	Aquatic plant growth	TGAI	A, B	Yes 424383-01, 431336-01	Yes ⁵
TIER III					
124-1	Terrestrial plant field testing	TEP	B, D, G	No	Reserved
124-2	Aquatic plant field testing	TEP	B, D, G	No	Reserved
158.590 NONTARGET INSECT TESTING - POLLINATORS					
141-1	Honeybee acute contact toxicity	TGAI	B, G	Yes 00028772	No
141-2	Honeybee toxicity	TEP	B, G	No	No
141-5	Field testing for pollinators	TEP	B, G	No	No

⁵Fulfilled for Selenastrum capricornutum. The remaining 4 species of aquatic plants must be tested in order to fulfill this Guideline requirement, due to the high solubility and aerial application of this chemical.

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