



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, DC 20460

OFFICE OF CHEMICAL
SAFETY AND
POLLUTION PREVENTION

MEMORANDUM

PC Codes: 034902, 050507
DP Barcodes: 392945, 392946

Date: January 20, 2012

Subject: DER Transmittal Memo for Two Studies for Ferric Sulfate and Ferrous Sulfate Monohydrate

To: Katherine St. Clair, Chemical Review Manager
Mary Manibusan, Branch Chief
Pesticide Re-evaluation Division

From: Anita Ullagaddi, Biologist *Anita 1/20/12*
Nancy Andrews, Branch Chief *[Signature]*
Environmental Risk Branch I
Environmental Fate and Effects Division *1/23/12*

Please find the attached DER summaries for two submitted ecotoxicity studies that evaluated the effects of ferric sulfate (PC code 034902) and ferrous sulfate monohydrate (PC code 050507) on terrestrial plant seedling emergence. Both of the studies were Tier I tests and were classified as invalid.

Study Type	Organism	MRID	Study Classification	Results
Tier I Seedling Emergence 850.4100 Ferric Sulfate (PC code 034902)	Tomato (<i>Lycopersicon esculentum</i>) Cucumber (<i>Cucumis sativus</i>) Lettuce (<i>Lactuca sativa</i>) Soybean (<i>Glucine max</i>) Cabbage (<i>Brassica oleracea</i>) Carrot (<i>Daucus carota</i>) Oat (<i>Avena sativa</i>) Ryegrass (<i>Lolium perenne</i>) Corn (<i>Zea mays</i>) Onion (<i>Allium cepa</i>)	485550-01	Invalid	Not applicable
Tier I Seedling Emergence 850.4100 Ferrous Sulfate Monohydrate (PC code 050507)	Tomato (<i>Lycopersicon esculentum</i>) Cucumber (<i>Cucumis sativus</i>) Lettuce (<i>Lactuca sativa</i>) Soybean (<i>Glucine max</i>) Cabbage (<i>Brassica oleracea</i>) Carrot (<i>Daucus carota</i>) Oat (<i>Avena sativa</i>) Ryegrass (<i>Lolium perenne</i>) Corn (<i>Zea mays</i>) Onion (<i>Allium cepa</i>)	485586-01	Invalid	Not applicable

**DATA EVALUATION RECORD
TIER I TERRESTRIAL PLANT SEEDLING EMERGENCE STUDY**

1. **CHEMICAL**: Ferric sulfate PC Code No.: 034902

2. **TEST MATERIAL**: Ferric sulfate Purity: 48%

3. **CITATION**

Authors: Younger, Cole

Title: Ferric sulfate solution – Final Report – Terrestrial Plant
Toxicity, Seedling Emergence OPPTS 850.4100

Study Completion Date: July 21, 2011

Laboratory: Stillmeadow, Inc.

Sponsor: Iron Salts Work Group, c/o Lilly Miller Brands, Atlanta, GA

Laboratory Report ID: 14975-11

MRID No.: 485550-01

DP Barcode: 392945

4. **REVIEWED BY**: Anita Ullagaddi, Biologist, USEPA/OPP/EFED/ERB1

Signature: 

Date: 1/20/12

5. **REVIEWED BY**: Meghan Radtke, Biologist, USEPA/OPP/EFED/ERB1

Signature: 

Date: 1/20/12

6. **CONCLUSIONS**:

EC₂₅: Not applicable

NOAEC: Not applicable

7. ADEQUACY OF THE STUDY:

A. Classification: Invalid

B. Rationale: This Tier I test does not meet the data requirement for a known phytotoxicant. There was a major flaw in the study design because the exact number of planted seeds was not known; thus, the percent emergence and survival could not be accurately calculated. In addition, there was poor control emergence in five out of ten of the test species, and $\geq 25\%$ effect was seen in two of the remaining species for one endpoint.

C. Reparability: N/A

8. GUIDELINE DEVIATIONS:

Not assessed due to major study flaws, as described in rationale above.

9. SUBMISSION PURPOSE: Registration Review

10. MATERIALS AND METHODS:

Not included due to major flaw in study design.

11. RELEVANT RESULTS:

Emergence

Species	Control	Treated
Tomato	75%	61.1%
Cucumber	97.2%	75%
Ryegrass	80.6%	80.6%
Cabbage	83.3%	75.0%
Oat	100%	100%
Corn	25%	50%
Onion	41.7%	52.8%
Lettuce	2.8%	61.1%
Carrot	16.7%	47.2%
Soybean	5.6%	33.3%

Species in bold exhibited control emergence of less than 70%.

Reduction in Selected Endpoints of Treatment Groups in Comparison to Control Groups

Species	Length	Dry Weight	Emergence*	Survival*
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Cabbage	-22.0%	18.49%	15.14%	15.14%
Cucumber	9.13%	-16.5%	23.85%	23.85%
Oat	5.58%	26.59%	0%	0%
Ryegrass	11.88%	6.25%	2.76%	2.76%
Tomato	-5.48%	26.15%	20.84%	20.84%

Species in bold exhibited a treatment effect (reduction in growth) of greater than 25% for one endpoint.
 *Emergence and Survival endpoints are likely to be underestimated because it is not known exactly how many seeds were planted.

12. CONCLUSIONS:

This study is classified as invalid. There was a major flaw in the study design because the exact number of planted seeds was not known; thus, the percent emergence and survival could not be accurately calculated (results included in table above may be an underestimation of effect on emergence). In addition, there was poor control emergence in five out of ten of the test species, and $\geq 25\%$ effect was seen in two of the five remaining species. Finally, a Tier I test would not satisfy data requirements for a known phytotoxicant.

13. REFERENCES:

U.S. Environmental Protection Agency, Series 850 - Ecological Effects Test Guidelines (draft), OPPTS Number 850.4100: Terrestrial Plant Toxicity, Tier I (Seedling Emergence). 1996.

DP Barcode: 392946

MRID No.: 48558601

**DATA EVALUATION RECORD
TIER I TERRESTRIAL PLANT SEEDLING EMERGENCE STUDY**

1. **CHEMICAL**: Ferrous sulfate monohydrate PC Code No.: 050507

2. **TEST MATERIAL**: Ferrous sulfate monohydrate Purity: 30.34% iron

3. **CITATION**

Authors: Younger, Cole

Title: Ferrous sulfate monohydrate – Final Report – Terrestrial
Plant Toxicity, Seedling Emergence OPPTS 850.4100

Study Completion Date: July 25, 2011

Laboratory: Stillmeadow, Inc.

Sponsor: Iron Salts Work Group, c/o Lilly Miller Brands, Atlanta, GA

Laboratory Report ID: 15059-11

MRID No.: 485586-01

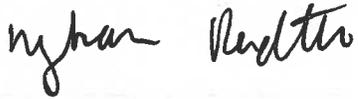
DP Barcode: 392946

4. **REVIEWED BY**: Anita Ullagaddi, Biologist, USEPA/OPP/EFED/ERB1

Signature: 

Date: 1/20/12

5. **REVIEWED BY**: Meghan Radtke, Biologist, USEPA/OPP/EFED/ERB1

Signature: 

Date: 1/20/12

6. **CONCLUSIONS**:

EC₂₅: Not applicable

NOAEC: Not applicable

7. ADEQUACY OF THE STUDY:

A. Classification: Invalid

B. Rationale: This Tier I test does not meet the data requirement for a known phytotoxicant. There was a major flaw in the study design because the exact number of planted seeds was not known; thus, the percent emergence and survival could not be accurately calculated. In addition, there was poor control emergence in seven out of ten of the test species, and there was a greater than 25% reduction in at least one endpoint for two of the remaining species.

C. Reparability: N/A

8. GUIDELINE DEVIATIONS:

Not assessed due to major study flaws, as described in rationale above.

9. SUBMISSION PURPOSE: Registration Review

10. MATERIALS AND METHODS:

Not included due to major flaw in study design.

11. RELEVANT RESULTS:

Emergence

Species	Control	Treated
Tomato	53.8%	77.7%
Cucumber	77.8%	63.9%
Lettuce	19.4%	41.7%
Soybean	72.2%	58.3%
Cabbage	8.3%	22.2%
Carrot	13.9%	75.0%
Oat	100.0%	33.3%
Ryegrass	5.5%	44.4%
Corn	16.7%	66.7%
Onion	5.6%	38.9%

Species in bold exhibited control emergence of less than 70%.

Reduction in Selected Endpoints of Treatment Groups in Comparison to Control Groups

Species	Length	Dry Weight	Emergence*	Survival*
Cucumber	1.90%	-9.85%	22.2%	25.93%
Oat	22.70%	19.95%	66.67%	72.22%
Soybean	-36.40%	-14.10%	12.00%	12.00%

Species in bold exhibited a treatment effect (reduction in growth) of greater than 25% for at least one endpoint.

*Emergence and Survival endpoints are likely to be underestimated because it is not known exactly how many seeds were planted.

12. CONCLUSIONS:

This study is classified as invalid. There was a major flaw in the study design because the exact number of planted seeds was not known; thus, the percent emergence and survival could not be accurately calculated (results included in table above may be an underestimation of effect on emergence). In addition, there was poor control emergence in seven out of ten of the test species, and there was a greater than 25% reduction in at least one endpoint for two of the remaining species. Finally, a Tier I test would not satisfy data requirements for a known phytotoxicant.

13. REFERENCES:

U.S. Environmental Protection Agency, Series 850 - Ecological Effects Test Guidelines (draft), OPPTS Number 850.4100: Terrestrial Plant Toxicity, Tier I (Seedling Emergence). 1996.