7-30-90

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1. **Chemical** - fenoxaprop-P-ethyl

2. **Test Material** - Formulated fenoxaprop-P-ethyl; tested as 7.2% a.i.

3. **Study Type**

Non-target plant phytotoxicity - terrestrial plants, Tier II Vegetative Vigor

4. **Study ID:**

Chetram, R. S., 1989. Tier II. Vegetative Vigor. Nontarget Phytotoxicity Study. HOE-046360 - Study No.: LR89-14A.
Performed By: Pan-Agricultural Labs., Inc.
Madera, CA.
Submitted By: Hoechst Clanese Corp.
Sumerville, N.J.
MRID No: 412769-07
Submission Volume: 7 of 7

5. **Reviewed By:**
Richard C. Petrie, Agronomist
EFED/EEB
Signature: Richard C. Petrie
Date: 7/30/90

6. **Approved By:**
Ann Stavola, Head, Section 3
EFED/EEB
Signature:
Date: 7/30/90

7. **Conclusions:** This study is scientifically sound and satisfies the Agency guideline requirement for 123-1, Tier II, Non-target Plant Phytotoxicity for vegetative vigor. A total visual phytotoxic affect was observed on corn at 0.012#ai/Acre. Corn was determined the most sensitive species tested with EC25 values of 0.0025#ai/Acre for plant height and 0.0052#ai/Acre for dry weight. The no-effect level was less than 0.0006#ai/Acre. The next most sensitive species were ryegrass and oat. The percentage active ingredient listed on the Super Whip and Super Acclaim labels is 6.27. The percentage active ingredient tested was 7.2. This difference is not considered significant enough to invalidate this study.

8. **Recommendation:**

A Tier III non-target plant terrestrial field study is required. A greater than 25% detrimental affect was noted for one or more species tested.

9. **Background:** Non-target plant phytotoxicity studies were requested of the registrant by EEB on July 17, 1988.

10. **Discussion of Individual Tests:** N/A.

11. **Materials and Methods:**

Based on Tier I Vegetative Vigor test results, oat (Avena sativa), perennial ryegrass (Lolium perenne), and corn (Zea mays) were determined most sensitive to HOE-046360 and therefore selected for Tier II testing. The seeds were planted in plastic pots 7.5x7.5x6.0 cm containing supersoil (with less than 0.5% organic matter). The plants were fertilized weekly with Peter's Special (20-20-20, N-P-K) at the rate of 1.0 tsp./gallon water. Ten seeds were planted per pot; corn was planted to a depth of 2.5 cm and oat and ryegrass to a depth of 1.3 cm. Each treatment was replicated 3 times.

Application of HOE-046360 was by use of a belt sprayer equipped with a single Tee-jet 8001-E nozzle at a height of 12 inches, nozzle pressure of 50 psi, spray swath of 20 inches.

On May 10, 1989 HOE-046360 was applied to oat, ryegrass, and corn at the rates of 0.0006, 0.0120, 0.0240, 0.0480, 0.0969# ai/Acre. Plants were sprayed at the equivalent of 50 gallons water per acre. Light measurements were taken at canopy height at 10:00AM and 2:00PM on weekdays. Approximately 18 ml of water were used to irrigate each pot per day using an automatic irrigation system. Test was terminated 21 days after treatment.

Plant height was recorded prior to treatment and 21 days after treatment. Phytotoxicity ratings were taken 7, 14, and 21 days after treatment. Twenty-one days after treatment plants were cut at soil level and dried at 70 degrees C for 48 hours. After drying, the dry weight of the plant material was recorded.

12. Reported Results:

PLANT HEIGHT: (21 days after treatment, in # ai/Acre)

Species	No-effect level	EC25	EC50
CORN	0.0048	0.0060	0.0180
OAT	0.0480	0.1150	0.2940
RYEGRASS	0.0480	0.0670	0.2110

PLANT DRY WEIGHT: (21 days after treatment, #ai/Acre)

CORN	0.0060	0.0060	0.0180
OAT	0.0480	0.0690	0.1180
RYEGRASS	0.0960	N/D	N/D

N/D = No statistical analysis was possible due to a low dose-response.

VISUAL PHYTOTOXICITY RATINGS: (21 days after treatment)
A 0 to 4 scale was used: 0 = no effect
1 = slight effect on one leaf
2 = moderate effect, whole plant
3 = severe effect, whole plant
4 = total effect, plant death

	(#ai/A) Rate	Visual Phyto Rating	Stat. Sign.
CORN Study 1	0.000	0.0	D
	0.006	1.1	C
	0.012	3.9	A
	0.024	2.7	B
	0.048	4.0	A
	0.096	4.0	A
Study 2	0.0000	0.0	B
	0.0006	0.0	B
	0.0012	0.0	B
	0.0024	0.0	B
	0.0048	0.0	B
	0.0096	1.2	A
OAT	0.096	1.3	-
	All other rates	0.0	-
RYEGRASS	0.048	0.8	-
	0.096	1.5	-
	All other rates	0.0	-

13. **Study Author's Conclusions/Quality Assurance Measures:**

The most sensitive plant species tested was corn, as follows:

CORN: (#ai/Acre)

Rating	No-effect level	EC25	EC50
Plant height	< 0.0006	0.0025	0.0110
Plant dry weight	< 0.0012	0.0052	0.0150

Test results for oat and ryegrass are as follows:

OAT: (#AI/Acre)

Plant height	N/A	N/A	N/A
Plant dry weight	< 0.0480	0.0779	0.0986

RYEGRASS: (#ai/Acre)

Plant height	< 0.048	0.0817	0.1370
Plant dry weight	< 0.096	N/A	N/A

N/A = No statistical analysis was possible due to lack of dose-response.

The registrant reported the "statistical no-effect level", or the highest test concentration that was statistically similar to the control. The reviewer reported the no-effect level at or below which no adverse effects were observed in the data.

14. **Reviewers Discussion and Interpretation of Study Results:**

A. Test Procedure:

In general, the Tier II Non-target plant vegetative vigor study was conducted per Subdivision-J guidelines. Quality assurance was monitored by the Pan-Ag. quality assurance unit and the study was determined by Pan-Ag. to be in compliance with good laboratory practices.

B. Statistical Analysis:

The reviewer used the Steffans' Toxanol program for analysis of reported results. See attachments.

C. Discussion/Results:

By the use of an add-on study the registrant was able to more accurately identify EC25 and EC50 values and determine the no-effect level for corn, the most sensitive species tested.

The statistical results varied as follows:

CORN EC25 (#ai/Acre)	EPA	(NOEL in parens.)	HOECHST	
Plant height	0.0025	(0.0006*)	0.0060	(0.0048)
Plant dry weight	0.0052	(<0.0012**)	0.0060	(0.0060)
OAT EC25				
Plant height	N/A		0.0670	(0.0480)
Plant dry weight	0.0779		0.0690	(0.0480)
RYEGRASS EC25				
Plant height	0.0817	(<0.0480)	0.0670	(0.0480)
Plant dry weight	N/A		N/A	

N/A = Unable to perform statistical analysis due to low dose-response.
* = 7% adverse affect on plant height at 0.0006#ai/Acre noted.
** = 13% adverse affect on plant dry weight at 0.0012#ai/Acre noted.

D. Adequacy of Study: No major deviations from protocol were observed.

1. Classification - Core
2. Rationale- This study fulfills the Agency guideline requirement.
3. Repairability - N/A

15. **Compplетion of One Liner** - N/A

16. **CBI. Appendix:** N/A

R.Petrie Super Acclaim plants 01-09-90

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
.096	100	86	86	0
.048	100	83	83	0
.024	100	37	37	0
.012	100	77	77	0
.006	100	14	14	0

BECAUSE THE NUMBER OF ORGANISMS USED WAS SO LARGE, THE 95 PERCENT CONFIDENCE INTERVALS CALCULATED FROM THE BINOMIAL PROBABILITY ARE UNRELIABLE. USE THE INTERVALS CALCULATED BY THE OTHER TESTS.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 1.795235E-02

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS
3	3.371142E-02		1.503539E-02
1.293087E-02		1.733536E-02	

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
3	2.996256	27.00344	0

A PROBABILITY OF 0 MEANS THAT IT IS LESS THAN 0.001.

SINCE THE PROBABILITY IS LESS THAN 0.05, RESULTS CALCULATED USING THE PROBIT METHOD PROBABLY SHOULD NOT BE USED.

SLOPE = 1.4366

95 PERCENT CONFIDENCE LIMITS =-1.050111 AND 3.923311

LC50 = .0153295

95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

LC10 = 2.002149E-03

95 PERCENT CONFIDENCE LIMITS = 0 AND 1.267333E-02

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R.Petrie Super Acclaim plany 01-09-90

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
.096	100	80	80	0
.048	100	79	79	0
.024	100	49	49	0
.012	100	76	76	0
.006	100	26	26	0

Plant HT
0.015 ai/t

THE BINOMIAL TEST SHOWS THAT .006 AND .048 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 1.521213E-02

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
1	.1916717	2.452736E-02	1.779594E-02	2.897859E-02
1	7.120785E-02	8.356853E-03	0.018	
7.58256E-03	9.188706E-03			

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
3	2.79058	14.11703	0

A PROBABILITY OF 0 MEANS THAT IT IS LESS THAN 0.001.

SINCE THE PROBABILITY IS LESS THAN 0.05, RESULTS CALCULATED USING THE PROBIT METHOD PROBABLY SHOULD NOT BE USED.

SLOPE = 1.022163

95 PERCENT CONFIDENCE LIMITS =-.6853635 AND 2.72969

LC50 = 1.135201E-02 0.0113

95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

LC10 = 6.495456E-04 0.00065

95 PERCENT CONFIDENCE LIMITS = 0 AND 7.297913E-03

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R.Petrie Super Acclaim plants 01-09-90

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
.096	100	21	21	0
.048	100	0	0	0
.024	100	0	0	0
.012	100	0	0	0
.006	100	0	0	0

THE BINOMIAL TEST SHOWS THAT 0 AND +INFINITY CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS .096

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.

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R.Petrie Super Acclaim plant 01-09-90

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
.096	100	47	47	0
.048	100	2	2	0
.024	100	0	0	0
.012	100	0	0	0
.006	100	0	0	0

THE BINOMIAL TEST SHOWS THAT 0 AND +INFINITY CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 6.788227E-02 0.067

0.067

THE MOVING AVERAGE METHOD CANNOT BE USED WITH THIS DATA SET BECAUSE NO SPAN WHICH PRODUCES MOVING AVERAGE ANGLES THAT BRACKET 45 DEGREES ALSO USES TWO PERCENT DEAD BETWEEN 0 AND 100 PERCENT.

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
8	9.596606E-02	1	.9999554

SLOPE = 6.579377

95 PERCENT CONFIDENCE LIMITS = 4.541192 AND 8.617562

LC50 = 9.855601E-02 0.09855

95 PERCENT CONFIDENCE LIMITS = 9.090474E-02 AND .109996

LC10 = 6.319106E-02

95 PERCENT CONFIDENCE LIMITS = 5.347659E-02 AND 6.994621E-02

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R.Petrie Super Acclaim plants 01-09-90

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
.096	100	11	11	0
.048	100	0	0	0
.024	100	0	0	0
.012	100	0	0	0
.006	100	0	0	0

THE BINOMIAL TEST SHOWS THAT 0 AND +INFINITY CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 6.788227E-02

0.0678822

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
.096	100	30	30	0
.048	100	12	12	0
.024	100	0	0	0
.012	100	0	0	0
.006	100	0	0	0

THE BINOMIAL TEST SHOWS THAT 0 AND +INFINITY CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS .096

THE MOVING AVERAGE METHOD CANNOT BE USED WITH THIS DATA SET BECAUSE NO SPAN WHICH PRODUCES MOVING AVERAGE ANGLES THAT BRACKET 45 DEGREES ALSO USES TWO PERCENT DEAD BETWEEN 0 AND 100 PERCENT.

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
6	.1008773	1	.3965558

SLOPE = 3.008851

95 PERCENT CONFIDENCE LIMITS = 2.053205 AND 3.964498

LC50 = .1367929

95 PERCENT CONFIDENCE LIMITS = .1102007 AND .1988592

LC10 = 5.175779E-02

95 PERCENT CONFIDENCE LIMITS = 4.174163E-02 AND 6.043272E-02

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R Petrie Super Whip plants 01-11-90

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)	
9.600001E-03		100	22	22	0
.0048	100	4	4	0	
.0024	100	1	1	0	
.0012	100	3	3	0	
6.000001E-04		100	3	3	0

BECAUSE THE NUMBER OF ORGANISMS USED WAS SO LARGE, THE 95 PERCENT CONFIDENCE INTERVALS CALCULATED FROM THE BINOMIAL PROBABILITY ARE UNRELIABLE. USE THE INTERVALS CALCULATED BY THE OTHER TESTS.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 0

THE MOVING AVERAGE METHOD CANNOT BE USED WITH THIS DATA SET BECAUSE NO SPAN WHICH PRODUCES MOVING AVERAGE ANGLES THAT BRACKET 45 DEGREES ALSO USES TWO PERCENT DEAD BETWEEN 0 AND 100 PERCENT.

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
5	2.353104	4.495173	3.695786E-03

SINCE THE PROBABILITY IS LESS THAN 0.05, RESULTS CALCULATED USING THE PROBIT METHOD PROBABLY SHOULD NOT BE USED.

SLOPE = 1.09887

95 PERCENT CONFIDENCE LIMITS =-.586778 AND 2.784519

LC50 = 7.864061E-02

95 PERCENT CONFIDENCE LIMITS = 1.088484E-02 AND +INFINITY

LC10 = 5.494325E-03

95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

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Veg, Vigor

R Petrie Super Whip plants 01-11-90

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)	
9.600001E-03		100	19	19	0
.0048	100	13	13	0	
.0024	100	9	9	0	
.0012	100	13	13	0	
6.000001E-04		100	0	0	0

THE BINOMIAL TEST SHOWS THAT 0 AND +INFINITY CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 0

THE MOVING AVERAGE METHOD CANNOT BE USED WITH THIS DATA SET BECAUSE NO SPAN WHICH PRODUCES MOVING AVERAGE ANGLES THAT BRACKET 45 DEGREES ALSO USES TWO PERCENT DEAD BETWEEN 0 AND 100 PERCENT.

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
4	2.574918	3.878555	8.741677E-03

SINCE THE PROBABILITY IS LESS THAN 0.05, RESULTS CALCULATED USING THE PROBIT METHOD PROBABLY SHOULD NOT BE USED.

SLOPE = .7392065
95 PERCENT CONFIDENCE LIMITS =-.4469649 AND 1.925378

LC50 = .1367995
95 PERCENT CONFIDENCE LIMITS = .0112436 AND +INFINITY

LC10 = 2.618339E-03
95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

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Superwhip / Super Acclaim

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[illegible]

[illegible] = [illegible]	[illegible] LC50 =	.[illegible] LC25 = Corn - HT. [Veg. Vigor]
[illegible] = [illegible]	[illegible] LC50 =	.[illegible] LC25 = Corn - DryWT [Veg. Vigor]
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Superwhip | Superclaim 5/10/90

oat-DryWT [Veg. Vigor
Ryegrass HT Veg. Vigor