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SUBJECT: Data Evaluation Report on the Acute Toxicity of Propanil to Terrestrial Vascular Plants: Tier II Vegetative Vigor Test (MRID 471447-02)

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The Environmental Fate Effects Division (EFED) has completed a review of the following Propanil terrestrial vascular plants Tier II ~~acute toxicity~~ vegetative vigor study. The study is scientifically sound and meets the guideline requirements and is classified as acceptable. Provided is the citation and a brief summary of the study:

CITATION:

Eley, Richard. 2004. Evaluation of the Phytotoxicity of Propanil (60% WG), Based on OECD Guideline 208 B, Vegetative Vigor Test Terrestrial Non Target Plants- Southern Europe, 2004. Unpublished study performed by AgroChemex Ltd., Essex, UK. Laboratory report number ACE-04-087. Study sponsored by Dow AgroScience, European Development Center, Oxon, UK. Study completed December 3, 2004.

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EXECUTIVE SUMMARY:

The effect of Propanil 60% WG (plus Herbidown, paraffin oil) on the vegetative vigor of monocot (oat, *Avena sativa*; onion, *Allium cepa*; rice, *Oryza sativa*; and ryegrass, *Lolium perenne*) and dicot (cabbage, *Brassica oleracea*; carrot, *Daucus carota*; cotton, *Gossyopium hirsutum*; cucumber, *Cucumis sativus*; and pea, *Pisum sativum*) crops was studied at varying nominal application rates. Oat, rice, ryegrass and carrot were treated with nominal propanil application rates of 0 (negative control), 0.028, 0.055, 0.11, 0.22, 0.44, 0.88, 1.8, 3.5, 7.0 and 14 lbs ai/A. Onion, cabbage, oilseed rape, pea, cucumber and cotton were treated with nominal propanil application rates of 0 (negative control), 0.0069, 0.014, 0.028, 0.055, 0.11, 0.22, 0.44, 0.88, 1.8 and 3.5 lbs ai/A. Herbidown (paraffin oil) was included in the preparation of each nominal application rate. A single application occurred to each species on one of four different days; test material from one batch was used during two of these applications and material from a different batch (with slightly different purity) was used during the two remaining applications. The growth medium used in the test was natural soil, classified as a sandy loam, with a pH of 7.7 and an organic matter content of 1.5% w/w. On day 21 the surviving plants per pot were recorded and cut at soil level for measuring the foliar fresh weight and survival.

In the vegetative vigor test, foliar fresh weight was affected by Propanil 60% WG treatment. The most sensitive monocot species, based on fresh weight, in the vegetative vigor test was onion with an EC_{25} of 0.13 lbs ai/A and a NOAEC of 0.028 lbs ai/A. The most sensitive dicot species, based on foliar fresh weight, was cabbage with an EC_{25} of 0.088 lbs ai/A and a NOAEC 0.028 lbs ai/A (Table 1).

All species exhibited inhibition of $\geq$ 25% in foliar fresh weight relative to the negative control. With the exception of rice, ryegrass, cotton and cucumber, all species exhibited inhibition of $\geq$50% relative to the negative control. Survival was 100% at all treatment levels for oat, rice, ryegrass and cotton; mortality was observed for all remaining species. The study author reported no NOAEL values for biomass or survival (Table 2). The most sensitive monocot, based on fresh weight, was onion with an EC_{50} of 0.33 lbs ai/A. The most sensitive dicot, based on fresh weight, was an EC_{50} of 0.26 lbs ai/A.

There were no compound-related phytotoxic effects for any control plants or for treated ryegrass and cotton plants. All other species exhibited injury relative to control plants; however, the observed injuries were not specified.

This toxicity study is acceptable and satisfies the guideline requirement for a nontarget terrestrial plant Vegetative Vigor Tier II toxicity study.

Table 1. Species effects based on fresh weight (lbs ai/A)

Species	NOAEC	EC_{05}	EC_{25}	EC_{50}
Oat	0.11	0.15	0.75	2.3
Onion*	0.028	0.025	0.13	0.41
Rice	3.5	3.1	12	>14
Ryegrass	0.88	1.4	7.5	>14
Cabbage*	0.028	0.019	0.088	0.25
Carrot	0.028	<0.028	0.094	0.43
Cotton	0.11	0.019	1.2	>3.5
Cucumber	0.22	0.014	1.6	>3.5
Oilseed Rape	0.11	0.073	0.39	1.3
Pea	<0.0069	0.052	0.17	0.37

* Most sensitive species

Table 2. Species effects based on survival (lbs ai/A)

Species	NOAEC	EC_{05}	EC_{25}	EC_{50}
Oat	14	>14	>14	>14
Onion	0.88	0.58	1.7	>3.5
Rice	14	>14	>14	>14
Ryegrass	14	>14	>14	>14
Cabbage	0.11	N.D.	N.D.	N.D.
Carrot	1.8	1.1	2.6	4.7
Cotton	3.5	>3.5	>3.5	>3.5
Cucumber	3.5	N.D.	>3.5	>3.5
Oilseed Rape	0.44	0.13	1.9	>3.5
Pea	0.44	N.D.	N.D.	N.D.

* Most sensitive species

RESULTS and DISCUSSION:

A. INHIBITORY EFFECTS: Vegetative Vigor:

All species exhibited inhibitions of ≥25% in foliar fresh weight relative to the negative control. With the exception of rice, ryegrass, cotton and cucumber, all species exhibited inhibitions of ≥50% relative to the negative control. Survival was 100% at all treatment levels for oat, rice, ryegrass and cotton; mortality was observed for all remaining species. The study author reported no NOAEC values for biomass or survival. The most sensitive monocot, based on fresh weight, was onion with an EC_{50} of 0.33 lbs ai/A. The most sensitive dicot, based on fresh weight, was cabbage with an EC_{50} of 0.26 lbs ai/A.

There were no compound-related phytotoxic effects for any control plants or for treated ryegrass and cotton plants. All other species exhibited injury relative to control plants; however, the observed injuries were not specified.

B. REPORTED STATISTICS:

Analyses were carried out by Eileen Paterson of Dow AgroSciences, Kings Lynn, Norfolk, UK using audited data recorded in ARM and Minitab 12.2 software.

C. VERIFICATION OF STATISTICAL RESULTS BY THE REVIEWER:

Statistical Method(s): Replicate biomass and survival data were analyzed if inhibitions of ≥5% relative to the negative control were observed. Prior to determining the NOAEC value, the normality was tested using the Chi-square and Shapiro-Wilks tests and the homogeneity of variance was tested using the Hartley and Bartlett's tests. If the data met these assumptions of ANOVA the NOAEC value was determined using the parametric Dunnett's (or Bonferroni's) test and Williams' test. If the data did not meet these assumptions, the NOAEC value was determined using non-parametric Kruskal-Wallis test in conjunction with visual interpretation of the dose-response data. Since Toxstat can only analyze ten groups including the control, the reviewer had to exclude the highest treatment level from the NOAEC determination to compare the nine highest treatment levels to the control. After the NOAEC value was determined, the reviewer manually input the data from the tenth treatment group into the notepad text file to determine the ECx values using the probit analysis via Nuthatch statistical software. All analyses were conducted using the nominal application rates converted by the reviewer to lbs ai/A. Replicates exhibiting complete mortality were excluded from fresh weight analyses.

D. STUDY DEFICIENCIES:

Two different batches of test substance (with slightly different purities) were applied during this study and it was not clear from the report which applications/species received which batches. Applications A-D were mentioned, with A and B receiving one batch (Batch BPL 170) and C and D receiving the other (Batch BPL 173). Corn, a required test species, was not tested in this study. Rice was tested in lieu of corn. Propanil is used to protect rice.

E. REVIEWER'S COMMENTS:

The reviewer's analyses provided NOAEC, EC_{05}, EC_{25} and EC_{50} values, while the study author only reported EC_{50} values. Based on the reported EC_{50} values, the reviewer's results agreed with the study author's results and onion and cabbage were the most sensitive monocot and dicot species.