

US EPA ARCHIVE DOCUMENT

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**DATA EVALUATION RECORD**  
**TERRESTRIAL PLANT TOXICITY, TIER I (SEEDLING EMERGENCE AND VEGETATIVE VIGOR)**  
**GUIDELINE OPPTS 850.4100 AND 850.4150**

1. **CHEMICAL:** PXTS **PC Code No:** 006929

2. **TEST MATERIAL:** PXTS TECHNICAL **Purity:** 100% ai  
Batch #6, Bottle #1, Lot/Code: 1685-9-1  
EPA File Symbol: 75799-R

3. **CITATION**

**Author:** John Porch, Frank Lezotte, Henry Krueger  
**Title:** PXTS: A Toxicity Test to Determine the Effects of the Test Substance on Seedling Emergence and Vegetative Vigor of Rice  
**Study Completion Date:** January 16, 2002  
**Laboratory:** Wildlife International, Ltd  
8598 Commerce Drive  
Easton, MD 21601  
**Sponsor:** Akzo Nobel Functional Chemicals LLC  
5 Livingstone Avenue  
Dobbs Ferry, New York 10522  
**Laboratory Report ID:** 497-102  
**MRID No.:** 460626-33

4. **REVIEWED BY:** Srinivas Gowda, Biologist  
US EPA/OPP/AD/RASSB/Team 1

**Signature:** Srinivas Gowda

**Date:** 05/13/04

5. **APPROVED BY:** Norm Cook, Chief  
US EPA/OPP/AD/RASSB

**Signature:** Norm Cook

**Date:** 6/3/04

6. **STUDY PARAMETERS**

**Study Type:** Tier I Seedling Emergence and Vegetative Vigor  
**Definitive Study Duration:** The duration of the definitive study was 21 days. The test was performed from November 30 to December 21, 2001 (including dry weight determination).

7. **CONCLUSIONS**

**Results Synopsis:** Seeds from one monocotyledon species, rice (*Oryza sativa*), were tested. The percent inhibition of emergence, seedling height, and seedling dry weight in a seedling emergence test and seedling height and seedling dry weight in a vegetative vigor test, as well as

treatment-related morphological abnormalities, were determined. Control and treatment means were statistically compared at the single nominal application rate tested (30 g/ha). Results of the seedling emergence test (Tier I) indicated adverse effects less than 25 percent on the one species tested (7% inhibition of seedling emergence; 5% and 8% for seedling height and seedling dry weight in the seedling emergence test and 5% and -1% for seedling height and seedling dry weight in the vegetative vigor test). Tier II tests were, therefore, not required.

**Based on adverse effects:**

Monocot: Rice (*Oryza sativa*)

Most sensitive parameter: Seedling dry weight (seedling emergence test)

Level-of-effect: 8% at the 30 g/ha level

**Results Validation Synopses:** Validated results indicate that the level of adverse effect was less than 25 percent for emergence, seedling height, and seedling dry weight in the seedling emergence test and for seedling height and seedling dry weight in the vegetative vigor test.

Monocot: Rice (*Oryza sativa*)

Most sensitive parameter: Seedling dry weight

Level-of-effect: 8%

EC25: >5.9 mg/L (mean measured)

NOEC: ≥5.9 mg/L (mean measured)

8. **ADEQUACY OF THE STUDY**

- A. **Classification:** Core
- B. **Rationale:** Study not discounted for minor guideline deviations discussed in Section 9.
- C. **Repairability:** Not applicable.

9. **GUIDELINE DEVIATIONS:** The following guideline deviations were based on EPA OPPTS Guideline 850.4100 and 850.4150:

- The guidelines state that six species of at least four families of dicots and four species of at least two families of monocots should be tested. Three required species are corn, soybeans, and a root crop. Only one plant species, rice (*Oryza sativa*), was tested in this study per previous discussion with the Antimicrobials Division (OPP). The AD requests that rice be tested in lieu of the 10 typically recommended plants.
- The guidelines state that at least three replicates, each with 10 seeds, should be tested per dose level for the seedling emergence tests. Six replicates, each with 5 seeds, were used in the vegetative vigor test. The total number of plants equals 30, as stated in the guidelines.

- The maximum environmental concentration and EC values were not reported in the Study Report.

10. **SUBMISSION PURPOSE:** Registration

11. **MATERIALS AND METHODS**

A. **Test Organisms**

Guideline Criteria	Reported Information
<p><b>Species:</b></p> <ul style="list-style-type: none"> <li>• 6 dicots in 4 families, including soybean, a root crop (e.g., carrot) and corn.</li> <li>• 6 dicots in 4 families and 4 monocots in 2 families.</li> <li>• Testing of more than 10 plant species encouraged.</li> </ul>	<ul style="list-style-type: none"> <li>• One test species: rice, <i>Oryza sativa</i>, Poaceae (p.11) per discussion with the US EPA/OPP/AD/RASSB</li> </ul>
<p>Seed sources/cultivars provided?</p>	<ul style="list-style-type: none"> <li>• Seeds supplied by California Cooperative Rice Research Foundation (p.11)</li> </ul>
<p>Germination history of seeds provided?</p>	<ul style="list-style-type: none"> <li>• Study Report states that USDA seed germination control standard (1) for rice is 80% (p.11)</li> </ul>
<p><b>Seed Storage/cultivars Treatment and Maintenance</b></p> <ul style="list-style-type: none"> <li>• May be surface-sterilized.</li> </ul>	<ul style="list-style-type: none"> <li>• Seeds used in study were not treated with fungicides, insecticides, or repellents prior to test initiation (p.11)</li> </ul>

B. **Test System**

Guideline Criteria	Reported Information
<p><b>Site of Study:</b></p> <ul style="list-style-type: none"> <li>• Controlled conditions in growth chambers, greenhouses or small field plots.</li> </ul>	<ul style="list-style-type: none"> <li>• Study conducted at the Wildlife International, Ltd. greenhouse facility in Easton, Maryland (p.9)</li> </ul>
<p><b>Temperature:</b></p> <ul style="list-style-type: none"> <li>• Optimal conditions for species and varieties tested.</li> </ul>	<ul style="list-style-type: none"> <li>• Average temperature of greenhouse: <math>20.17 \pm 0.65^{\circ}\text{C}</math> (<math>16.07^{\circ}\text{C} - 31.98^{\circ}\text{C}</math>) (p.30)</li> </ul>
<p><b>Relative Humidity:</b></p> <ul style="list-style-type: none"> <li>• Optimal conditions for species and varieties tested.</li> </ul>	<ul style="list-style-type: none"> <li>• Mean relative humidity of greenhouse: <math>43.59 \pm 13.18\%</math> (<math>9.97\% - 85.10\%</math>) (p.30)</li> </ul>

Guideline Criteria	Reported Information
<b>Photoperiod:</b> <ul style="list-style-type: none"> <li>Optimal conditions for species and varieties tested.</li> </ul>	<ul style="list-style-type: none"> <li>Artificial lighting (high pressure sodium) was used to supplement natural sunlight to provide a uniform 14-hour photoperiod. (p.14)</li> </ul>
<b>Light Intensity:</b> <ul style="list-style-type: none"> <li>Optimal conditions for species and varieties tested.</li> </ul>	<ul style="list-style-type: none"> <li>Average photosynthetically active radiation reported to be <math>17.7 \pm 1.1</math> moles (15.4 - 20.3 moles) (p.30)</li> </ul>
<b>Planting Method/Type of Pot</b>	<ul style="list-style-type: none"> <li>Seedling emergence test: seeds planted in plastic pots (~16 cm diameter and 11 cm deep); seeds planted at ~2 cm depth (p.12)</li> <li>Vigor test: seeds planted in plastic pots (~11 cm diameter and 10 cm deep); after planting, placed in greenhouse and allowed to emerge and develop into seedlings; seedling age at test initiation was 14 days and each had 2 open leaves at time of application (p.12)</li> </ul>
<b>Method of Application</b> <ul style="list-style-type: none"> <li>Soil or support medium sprayed or otherwise treated.</li> </ul>	<ul style="list-style-type: none"> <li>Application made with a DeVries Research Track Sprayer (p.12)</li> <li>Simulated inadvertent direct application or the occurrence of off-target drift resulting from use of actual field application equipment (p.12)</li> </ul>
<b>Method of Watering</b>	<ul style="list-style-type: none"> <li>Water supplied by subirrigation with well water from the greenhouse facility (p.13)</li> </ul>
<b>Soil Medium:</b> <ul style="list-style-type: none"> <li>Name/designation of soil type, physical/chemical properties, pH, and percent organic matter.</li> </ul>	<ul style="list-style-type: none"> <li>Soil represents a loam soil, composed of kaolinite clay, industrial quartz sand and peat mixed in a 4:50:2 ratio (w:w:w) (p.11)</li> <li>Crushed limestone added to buffer pH; measured to be 7.8 (p.11)</li> <li>Slow release fertilizer added to provide nutrients (p.11)</li> <li>Soil consisted of: 49% sand, 30% silt, 21% clay (p.12)</li> <li>Organic matter content: 2.1% (p.12)</li> </ul>

Guideline Criteria	Reported Information
<b>Solvent:</b>	<ul style="list-style-type: none"> <li>• Test solutions prepared in acetone (p.10)</li> </ul>

**C. Test Design**

Guideline Criteria	Reported Information
<p><b>Doses/Dose Range:</b></p> <ul style="list-style-type: none"> <li>• Single concentration equal to no less than maximum label rate; or</li> <li>• If concentration in nontarget area estimated to be significantly less than maximum label rate, 3x the estimated maximum environmental concentration.</li> </ul>	<ul style="list-style-type: none"> <li>• Test concentration: 6 ppm (which is at least 480x the limit of solubility of PXTS in water) (p.9)</li> <li>• Spray mixtures applied at nominal spray volume of 5000 L/hectare, resulting in nominal application rate of 30 g PXTS/hectare (p.9)</li> </ul>
<p><b>Preliminary Test:</b></p>	<ul style="list-style-type: none"> <li>• Preliminary test not mentioned</li> </ul>
<p><b>Controls:</b></p> <ul style="list-style-type: none"> <li>• Negative and solvent</li> </ul>	<ul style="list-style-type: none"> <li>• Negative and solvent included in study (p.10)</li> </ul>
<p><b>Replicates Per Dose:</b></p> <ul style="list-style-type: none"> <li>• Three replicates per dose with minimum 10 seeds per pot.</li> </ul>	<ul style="list-style-type: none"> <li>• For seedling emergence test: four replicate pots with 10 seeds planted in each pot (p.9)</li> <li>• For vegetative vigor test: six replicates with five individually potted plants (p.9)</li> </ul>
<p><b>Duration of Test:</b></p> <ul style="list-style-type: none"> <li>• 14-days minimum</li> </ul>	<ul style="list-style-type: none"> <li>• 21-day test (p.9)</li> </ul>
<p><b>Weekly Observations:</b></p>	<ul style="list-style-type: none"> <li>• Observations made on days 7, 14, and 21 (p.9)</li> </ul>
<p><b>Maximum label rate or maximum environmental concentration reported?</b></p>	<ul style="list-style-type: none"> <li>• Not reported</li> </ul>

**12. REPORTED RESULTS**

Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements included in report?	• Yes (p. 3 and 4)
Name of test and investigator, name and location of laboratory, and start/end dates of test reported?	• Yes (cover page)
Percent emergence, shoot height, shoot dry weight, root length, root dry weight, and visual phytotoxicity reported?	• Yes (p.31 - 37)
Tabulated results indicating percentage effect level for each species as compared to untreated control plants?	• Yes (p.23)
Raw data included?	• Yes (appendices)
Statistical methods including an environmental or EC value reported?	• Statistical methods provided, but no EC values reported (p.16)

**Study results by parameter**

Species	Test	Parameter	Control Mean	Solvent Control Mean	Pooled Control Mean	Treatment Mean	% Effect Level
Rice ( <i>Oryza sativa</i> )	Seedling Emergence Test	Emergence	9.5	9.25	9.4	8.75	7
		Seedling height (cm)	16.3	16.3	16.3	15.4	5
		Seedling Dry Weight (g)	0.0203	0.0214	0.0209	0.0193	8
	Vegetative Vigor Test	Seedling height (cm)	29.9	26.8	28.4	26.8	5
		Seedling total dry weight (g)	0.675	0.617	0.646	0.652	-1

\* Based on comparison of pooled control and treatment means

**Observations:** The Study Report states that there were no apparent treatment related effects upon any endpoint for both the seedling emergence test and the vegetative vigor test. All of the percent reductions were less than 25%, indicating no higher-tiered testing was warranted.

**Statistical Method:** Mean values of the negative and solvent controls were compared using a t-test at a significance level of 0.05. If there was no significant difference, data from the two control groups were combined and the pooled control group mean was compared to the treatment group mean using the Dunnett's t-test. Results of the Dunnett's test were used to determine if adverse effects on test endpoints were present in the treatment group. If no adverse effect was found, the treatment application rate was determined to be the NOEC.

### 13. VERIFICATION OF STATISTICAL RESULTS

Species	Test	Parameter (% reduction compared with control)	EC <sub>25</sub> (mg/L) <sup>1</sup>	NOEC (mg/L) <sup>1</sup>
Rice ( <i>Oryza sativa</i> )	Seedling emergence	Seedling dry weight (8%)*	>5.9	≥5.9
		Percent emergence (7%)*	>5.9	≥5.9
		Seedling height (5%)*	>5.9	≥5.9
	Vegetative vigor	Seedling height (0.1%)**	>5.9	≥5.9
		Seedling dry weight (-1%)*	>5.9	≥5.9

\* Based on comparison of the pooled control and treatment means.

\*\* The study author reported slight significant differences between the negative and solvent control group mean heights on days 14 and 21; therefore, the mean solvent control was used for comparison with the treatment mean value.

<sup>1</sup> Values based on the mean measured spray mixture concentration.

**Statistical Method:** The negative and solvent control data were compared using a t-test to determine if there was a significant difference. If no significant difference was found, the two controls were pooled into one data set. If a significant difference was found, the treatment mean was compared to the solvent control mean. The percent reduction was determined using the pooled control (or solvent control) and the treatment data. The EC<sub>25</sub>'s were empirically estimated to be greater than the treatment level since none of the endpoints were reduced by greater than 25%. The NOECs were also empirically determined to be greater than the treatment level since no adverse effects were observed.

### 14. REVIEWERS COMMENTS

- Guideline deviations are presented in Section 9.