

Data Evaluation Report on the acute toxicity of BAS 510 02F (EP) to terrestrial vascular plants corn, cucumber, onion, radish, ryegrass, soybean, sugarbeet, sunflower, tomato, and wheat. [seedling emergence].

PMRA Submission Number 2001-1027

EPA MRID Number 454050-11 [for seedling emergence]

Data Requirement:

PMRA DATA CODE: 9.8.4-1 (TGAI)

EPA DP Barcode: D278418

OECD Data Point: IIA 8.12 (TGAI) and IIIA 10.8.1.1 (EP)

EPA Guideline: 122-1, 850.4100

Test material: End Use Product

Purity (%): 68.5% ai

Primary Reviewer:
{PMRA}

Peter Takacs

Date: March 28/02

Secondary Reviewer:
{EPA}

John E. Ravenscroft
John Ravenscroft

Date: June 17, 2002

Company Code: BAZ

Active Code: CHH-BAZ-4

Use Site Category: In Canada, this fungicide is proposed for use on USC 13, 14 and 30; agricultural feed, food and turf uses.

EPA PC Code: 128008

CITATION: Catherine M. Holmes, Dave Schwab. February 2001. Evaluating the Effects of BAS 510 02F on the Seedling Emergence of Non-Target Terrestrial Plants. ABC Laboratories, Inc. Analytical Chemistry and Field Studies 7200 E. ABC Lane Columbia, Missouri 65202-8015. BASF Study number: 46662.



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EXECUTIVE SUMMARY:

The effect of BAS 510 02F (EP) on the seedling emergence of monocot (corn (*Zea mays*), ryegrass (*Lolium perenne*), wheat (*Triticum aestivum*) and onion (*Allium cepa*)) and dicot cucumber (*Cucumis sativus*), radish (*Raphanus sativus*), soybean (*Glycine max*), sugarbeet (*Beta vulgaris altissima*), sunflower (*Helianthus annuus*), and tomato (*Lycopersicon esculentum*)) crops was studied at a nominal concentration of 611 g a.i./ha. The growth medium used in the seedling emergence test was natural soil (loam, pH 5.4, organic carbon 1.0%). A seedling was considered fully emerged upon exposure of the cotyledons from the soil. On day 14, the surviving plants per pot were recorded and cut at soil level for measuring the plant height and dry weight. The most sensitive monocot species in the seedling emergence test was onion, with 18% inhibition of seedling emergence. The EC25 could not be calculated as this effect level was not reached. The most sensitive dicot species was tomato, with a 24.1% reduction in dry weight of seedlings, again the EC25 could not be calculated.

No abnormalities were listed.

Results Synopsis

Seedling emergence

Monocot

Most sensitive monocot: onion

Most sensitive parameter: seedling emergence

Dicot

Most sensitive dicot: tomato

Most sensitive parameter: shoot weight

This toxicity study is classified as supplementary and does not satisfy the guideline requirement for a seedling emergence toxicity study.

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I. MATERIALS AND METHODS

GUIDELINE FOLLOWED:

This study was conducted following the EPA Subdivision J: 122-1, OPPTS 850.4100 Guidelines, parts of which were incorporated into ABC Protocol No. 45916.

COMPLIANCE:

U.S. EPA Good Laboratory Practice Standards; Pesticide Programs (40 CFR 160) and Organization for Economic Cooperation and Development 1997 Decision of the Council, Revised Principles of GLP [C(97)186/Final].

A. MATERIALS:

BAS 510 F is to be used 2-6 times per growing season depending on the crop, at a maximum recommended application rate of 875 g a.i./ha/application.

1. Test Material

BAS 510 02F (EP)

Description: end use product

Lot No./Batch No. :

Purity: 68.5% ai.

Stability of Compound

Under Test Conditions: not stated (OECD requires chemical stability in water and light)

Storage conditions of

test chemicals: Stored at room temperature

Physicochemical properties of the active ingredient (BAS 510 F)

Parameter	Values	Comments
Water solubility at 20°C	4.69 mg/L	low solubility
Vapour pressure	7×10^{-9} mbar @ 20 °C	not volatile
UV absorption	UV molecular extinction: 1.53×10^3 at 290 nm	-
pKa	does not dissociate in water	-
Kow	2.96	Not likely to bioconcentrate

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2. Test organism:

Monocotyledonous species:

The four monocot species tested were corn (*Zea mays*), ryegrass (*Lolium perenne*), and wheat (*Triticum aestivum*) representing the Graminae family, and onion (*Allium cepa*) representing the Amaryllidaceae family.

EPA requires 4 monocots in 2 families, including corn

Dicotyledonous species:

The six dicot species tested were cucumber (*Cucumis sativus*), radish (*Raphanus sativus*), soybean (*Glycine max*), sugarbeet (*Beta vulgaris altissima*), sunflower (*Helianthus annuus*), and tomato (*Lycopersicon esculentum*). These six species represented the families of Cucurbitaceae, Cruciferae, Leguminosae, Chenopodiaceae, Compositae, and Solanaceae, respectively.

EPA requires 6 dicots in 4 families, including soybean and a rootcrop.

OECD recommends a minimum of three species selected for testing, at least one from each of the following categories: Category 1: ryegrass, rice, oat, wheat, and sorghum; Category 2: mustard, rape, radish, turnip, and Chinese cabbage; Category 3: vetch, mung bean, red clover, fenugreek, lettuce, and cress.

Seed source: Various supply companies (see Table 1 in study)

Prior seed treatment/sterilization: none

Historical % germination of seed: 85-99%

Seed storage, if any: not stated

B. STUDY DESIGN:

1. Experimental Conditions

b) Definitive Study

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Table 1. Experimental Parameters - Seedling Emergence

Parameters	Seedling Emergence	
	Details	Remarks Criteria
Duration of the test	2 weeks	----- EPA requires a duration of 14 days. OECD recommends the test should be terminated no sooner than 14 days after 50 percent of the control seedlings have emerged
Number of seeds/plants/species/replicate	10 seeds for monocots and 5 for dicots	----- EPA requires 10 seeds per replicate. OECD recommends a minimum of five seeds planted in each replicate within 24 hours of incorporation of the test substance. All seeds of each species for each test should be of the same size class. The seed should not be imbibed.
Number of plants retained after thinning	not stated	
Number of replicates		
Control:	4	----- EPA requires at least 3 replicates per dose OECD requires a minimum of four replicates per treatment
Solvent control:	4	
Treated ones:	4	
Test concentrations (mg ai/kg soil and g ai/ha)	Only one concentration was used	not acceptable
Nominal:	0.55 lb ai/a = 616 g ai/ha	----- EPA requires at least 5 test concentrations with a dose range of 2X or 3X progression OECD requires 3 concentrations, preferably with application rates equivalent to 0.0 (control), 1.0, 10.0 and 100 mg substance per kg of oven dried soil.

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Parameters	Seedling Emergence	
	Details	Remarks Criteria
Method and interval of analytical verification LOQ: LOD:	no analytical measurements were taken	not acceptable
Solvent (type, percentage, if used)	crop oil	
<u>Test container (pot)</u> Size/Volume Material: (glass/polystyrene)	4x4 inch not stated	----- EPA recommends that non-porous containers be used. OECD requires non-porous plastic or glazed pots.
Growth facility	green house	
Method/depth of seeding	not stated	
<u>Test material application:</u> Application time including the plant growth stage Number of application Application interval Method of application	applied 48 hrs after seed planting to bare soil 1 single application overhead track sprayer	
Details of soil used Geographic location Depth of soil collection Soil texture % sand % silt % clay pH: % organic carbon CEC Moisture at 1/3 atm (%)	 40 44 16 5.4 1.04 12.3 meq 18.8	Acceptable ----- EPA prefers soil mixes containing sandy loam, loam, or clay loam soil with no greater than 2% organic matter. Glass beads, rockwool, and 100% acid washed sand are not recommended. OECD prefers the soil to be sieved (0.5 cm) to remove coarse fragments. Carbon content should not exceed 1.5% (3% organic matter). Fine particles (under 20um) should make up between 10 and 20%. The pH should be 5.0 and 7.5.

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Parameters	Seedling Emergence	
	Details	Remarks Criteria
Details of nutrient medium, if used	-	
Watering regime and schedules Water source/type: Volume applied: Interval of application: Method of application:	from the top for 2-3 days until seeds were established; subsequently from the bottom. Water was ABC well water.	acceptable <i>EPA prefers that bottom watering be utilized for seedling emergence studies so that the chemical is not leached out of the soil during the test.</i>
Any pest control method/fertilization, if used	not stated	
<u>Test conditions</u> Temperature: Photoperiod: Light intensity and quality: Relative humidity:	19.8-36.9 16 hr light 1000 W gro-light were used 11.8-74.2	 <i>EPA doesn't specify test temperatures but prefers that the cold vs warm loving plants be tested in two separate groups to optimize plant growth.</i> <i>OECD doesn't specify test conditions but recommends the temperature, humidity and light conditions be suitable for maintaining normal growth of each species for the test period.</i>
<u>Reference chemical</u> (if used) Name: Concentrations:	not used	
Other parameters, if any	-	

2. Observations:

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Table 2: Observation parameters - Seedling Emergence

Parameters	Seedling Emergence
	Details
Parameters measured (eg: number of germinated seeds, emerged seedlings, plant height, dry weight or other endpoints)	number of seedlings emerged at each observation, the percent emergence, shoot length and dried weight measurements, and phytotoxicity observations.
Measurement technique for each parameter	The total number of emerged seedlings after approximately 2 weeks of testing was used for statistical analysis to obtain the percent emergence data. Shoot length measurements were made from the base of the plants to the apical bud for the dicot species (except radish and sugarbeet) and to the tip of the longest, fully extended leaf for the monocot species, and radish and sugarbeet.
Observation intervals	measurements were taken at test termination
Other observations, if any	-
Were raw data included?	Yes
Phytotoxicity rating system, if used	The rating used a number designation for a particular symptom and was rated for prevalence based on the number of plants per pot (replicate) from 0-100% as noted on the emergence form. Ratings were based on slight effects (10-39%), moderate effects (40-69%), and severe effects (70-100%).

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II. RESULTS and DISCUSSION:

A. INHIBITORY EFFECTS:

Seedling Emergence:

No effect on emergence greater than 25% was detected for any of the species tested. Onion showed the greatest detrimental effect on emergence with the pooled controls having 89% emergence and the BAS 510 02F treatment having 73% emergence, resulting in an effect of -18%. Tomato exhibited the greatest calculated percent effect on shoot length with a -7.6% effect. Tomato also exhibited the greatest calculated percent effect on dried shoot weight with a -24.1% effect. Based on the rating scheme used, all adverse phytotoxic effects (greater than 10% reduction compared to control) detected can be classified as "slight effects" (10-39%).

[Briefly describe the effect on percent germination, % survival, plant height, and dry weight; dose response relationship. Compare with reference standard, if used; Report the most sensitive monocot and dicot along with their EC25]
Describe other effects - Any abnormal seedling development or appearance (lesion, swelling, loss of turgor, discoloration, unusual leaf/plant shape or size, dead plants, other abnormalities. Report any rating system used for the description of injury to the plant (include references). If there was no observed toxicity, state "There were no compound related phytotoxic effects."]

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Table 3: Effect of BAS 510 02F on Seedling Emergence

Treatment 611 g ai/ha	Seedling emergence %			Dry weight (g)			Shoot length (mm)		
	Treated group	Pooled control	Percent effect	Treated group	Pooled control	Percent effect	Treated group	Pooled control	Percent effect
Corn	100	100	0%	0.477	0.552	-13.5	491	511	-3.9
Cucumber	95	96	-1%	0.320	0.302	5.9	76	74	2.5
Onion	73	89	-18%	0.00558	0.00586	-4.9	78	80	-1.6
Radish	100	99	1%	0.238	0.242	-1.7	129	123	4.3
Ryegrass	88	93	-5%	0.00710	0.00648	9.7	113	113	0.0
Soybean	80	85	-6%	0.389	0.404	-3.7	137	136	1.0
Sugarbeet	88	76	16%	0.0837	0.0820	2.0	110	100	8.2
Sunflower	95	94	1%	0.312	0.350	-10.9	137	141	-2.5
Tomato	78	89	-12%	0.0460	0.0606	-24.1	56	61	-7.6
Wheat	93	88	6%	0.0642	0.0597	7.5	251	245	2.7

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**Table 4: Effect of BAS 510 02F on Seedling emergence:
most sensitive monocot and dicot plant species**

Statistical Endpoint	Seedling emergence
Monocot	
most sensitive species	Onion
NOEC for the most sensitive parameter (eg: dry weight)	not calculable, likely > 611 g ai/ha most sensitive parameter was seedling emergence
EC25 for the most sensitive monocot	not calculable
EC50 for the most sensitive monocot	not calculable
Reference chemical , if any: NOEC for most sensitive monocot IC50/EC50	not used
Dicot:	
most sensitive species	Tomato
NOEC for the most sensitive parameter (eg: dry weight)	not calculable, likely > 611 g ai/ha most sensitive parameter was dry weight of seedling
EC25 for the most sensitive dicot	not calculable
EC50 for the most sensitive dicot	not calculable

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B. REPORTED STATISTICS:

Due to a low adverse effect response in all species, no summary statistics could be calculated.

C. VERIFICATION OF STATISTICAL RESULTS BY THE REVIEWER:

Not applicable.

D. STUDY DEFICIENCIES:

The EPA requires 5 test concentrations to be used. This study used only one treatment level; 611 g ai/ha. The maximum application rate on the label is 875 g ai/ha. The EC25 and NOEC could not be calculated because of study design. The test concentration was not determined analytically. These deficiencies are considered to be major because a 25% reduction did not occur at the only treatment level of 611 g ai/ha. The study is supplementary and does not satisfy guideline requirements. It is possible, and likely, that had the maximum rate been tested, an EC25 would have been obtained.

E. REVIEWER'S COMMENTS:

This study has major deficiencies as stated above, and is not usable for risk assessment. However, the data shows that at the near maximum application rate of 611 g ai/ha, a 25% reduction in seedling emergence, weight or length, was not observed in any of the ten test species. This study is upgradeable to core if the registrant agrees to lower its maximum seasonal rate to 611 g ai/ha. If the maximum rate is maintained at the higher level, EFED would ask that the study be repeated correctly.

F. CONCLUSIONS:

Most sensitive monocot: onion

Most sensitive dicot: tomato

III. REFERENCES: