

US EPA ARCHIVE DOCUMENT



Data Evaluation Report on the toxicity of BAS 670 00 H to the predatory mite,  
*Typhlodromus pyri*.

PMRA Submission Number 2003-0839

EPA MRID Number 45901816

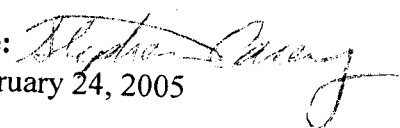
**Data Requirement:** PMRA DATA CODE: 9.2.5 (non-target terrestrial invertebrates - predators)  
EPA DP Barcode: D290076  
OECD Data Point:  
EPA Guideline: OPPTS None; OPP None

**Test material:** BAS 670 00 H **Purity (%):** 351.6 g a.i./L (31% a.i.)  
**Common name:** BAS 670 H  
**Chemical name:**  
IUPAC: [3-(4,5-dihydro-ioxazol-3-yl)-4-methane-sulfonyl-2-methyl-phenyl]-(5-hydroxy-1-methyl-1H-pyrazol-4-yl)methanone  
CAS name: [3-(4,5-dihydro-3-isoxazolyl)-2-methyl-4-(methylsulfonyl)phenyl](5-hydroxy-1-methyl-1H-pyrazol-4-yl)-  
CAS No.: 210631-61-8  
Synonyms: Reg. No. 375080, methanone

**Primary Reviewer (officer number):** 1268  
PMRA

**Signature:**  
**Date:** August 31, 2004

**Secondary Reviewer:** Stephen Carey, Biologist  
EPA

**Signature:**   
**Date:** February 24, 2005

**Company Code:** BAZ  
**Active Code:** MTN  
**Use Site Category:** 14  
**EPA PC Code:** 123009

**CITATION:** Goßmann, A. 2000. Effects of BAS 670 00 H on the predatory mite *Typhlodromus pyri* Scheuten (Acari, Phytoseiidae) in the laboratory - dose response design. IBACON, unpublished. Report No. 7624063; BASF Registration Document No. 2000/1017188. Submitted to PMRA on March 31, 2003.



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**EXECUTIVE SUMMARY:**

The toxicity of BAS 670 00 H (guarantee 351.6 g BAS 670 H/L, equivalent to 31% a.i.) to beneficial predators was determined for the predatory mite (*Typhlodromus pyri* Scheuten) in a two-week study on mortality and reproductive effects. The study was conducted according to the protocols of Louis & Ufer (1995) and Blümel et al. (1999). Dose rates for BAS 670 00 H were 0 (water control), 56, 112, 225, 450, and 675 mL/ha (or 0, 19.7, 39.4, 79.1, 158.2 and 237.3 g a.i./ha), which are up to nine times higher than the recommended label dose rate of 73 mL/ha. The test substance was applied to test chambers at a rate of 2 mg/cm<sup>3</sup> (= 200 L spray liquid/ha). Mites were exposed to water control, test substance, or toxic standard (positive control; Perfekthion EC [dimethoate]) for approximately 2 weeks. Mortality and escapees were measured at days 3, 7, 10, 12 and 14 after test initiation. A minimum male:female sex-ratio of 1:5 was established for reproductive testing. Mean egg production per female was determined during the second week. The following test validity criteria were met: control mortality = 13.3% (20% maximum), mean control reproduction = 8.7 eggs/female (minimum 4 eggs/female), and toxic standard mortality = 100% (required range of 55 - 99%).

Control-corrected mortality in mites ranged from -3.8% at 19.7 g a.i./ha to 5.8% at 237.3 g a.i./ha. Mortality in the treatments did not differ significantly from negative controls (Fischer exact-test,  $p > 0.05$ ). By Day 14, there was no significant difference in mean egg production per female between mites exposed to BAS 670 00 H (range  $7.8 \pm 3.4$  -  $9.6 \pm 0.8$  eggs per female), and those exposed to the negative control (mean =  $8.7 \pm 1.5$ ; Dunnett's test,  $p > 0.05$ ).

The beneficial capacity of predatory mites (E) was reduced by 10.9, 19.0 and -3.9% compared to the negative control at concentrations of 79.1, 158.2 and 237.3 g a.i./ha. According to the IOBC classification scheme (Bakker et al. 1992), BAS 670 00 H can be categorized as Harmless to *Typhlodromus pyri*.

This study is classified as acceptable and satisfies the Canadian conditional guideline requirement for an acute toxicity study with a beneficial terrestrial invertebrate predator (DACO 9.2.5). This study was designed to fulfill the requirements of the Commission Directive 96/12/EC and/or of the 'SETEC - Guidance Document on Regulatory Testing Procedures for Pesticides with Non-target Arthropods' (Barrett et al., 1994). This study does not fulfill any current U.S. EPA guideline. This study provides useful information on the acute toxicity of the end-use product BAS 670 00 H (31% a.i.) to the predatory mite, *Typhlodromus pyri*.





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**Results Synopsis**

Total Effect (E):  $\leq 19.0\%$

LR<sub>50</sub>:  $>675$  mL/ha ( $>273.3$  g a.i./ha)

NOER (mortality and reproduction): 675 mL/ha (273.3 g a.i./ha)

Endpoints Effected: none

**I. MATERIALS AND METHODS**

**GUIDELINE FOLLOWED:**

This study was not designed to fulfill any current U.S. EPA guideline. This study was designed to comply with the Methodical improvements of standard laboratory tests for determining the side effects of agrochemicals on predatory mites (Louis & Ufer, 1995) with current improvements by the ring-test group (Blumel et al., 1999).

The following deviations from the Louis & Ufer guidance occurred, but did not adversely affect the results of the study:

- a) relative humidity dropped to  $<60\%$  (55% minimum) for  $\sim 1$  h on Day 3;
- b) the sex ratio was adopted on Day 9 instead of Day 7.

**COMPLIANCE:**

Study conducted according to GLP: OECD (1997) and Chemikaliengesetz der Bundesrepublik Deutschland (ChemG), Anhang 1 (1994/97). Signed and dated GLP, Quality Assurance and a No Data Confidentiality claim were provided.



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**1. Test Material**

BAS 670 00 H

**Description:** grey-beige liquid herbicide

**Lot No./Batch No. :** 2000-1

**Purity:** 336 g a.i./L (nominal)  
351.5 g a.i./L (measured; 31% a.i.)

**Stability of Compound**

**Under Test Conditions:** The stability of the test substance under the conditions employed in this study was not determined.

**Storage conditions of test chemicals:**

in original container at room temperature (5 - 30°C)

**Density:** 1.134 g/mL

**Physicochemical properties of BAS 670 H (active ingredient of BAS 670 00 H).**

Parameter	Values	Comments
Water solubility at 20°C	510 mg/L in deionized H <sub>2</sub> O at 20°C >100 g/L at pH >9	Highly soluble
Vapour pressure	<1.0 x 10 <sup>-12</sup> mbar (= <1.01 x 10 <sup>-10</sup> Pa) at 20°C	Low volatility
UV absorption	207 nm: 0.7637 272 nm: 0.2426 300 nm: 0.1636 410 nm: 0.0027	Potential for phototransformation (i.e. absorbance occurring within 285 - 350 nm range)
pKa	4.06 @ 20°C	Dissociated at environmentally relevant pHs
Log Kow	-1.52 @ 20°C	Not likely to bioaccumulate





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**2. Test organism:**

**Species:** Predatory mite (*Typhlodromus pyri* Scheuten)  
**Age at test initiation:** ~2 day old protonymphs  
**Source:** PK Nützlingszuchten, Dr. Peter Katz, Industriestr.  
 38, D-73642 Welzheim.  
**Stage Transported:** ~1 day old eggs  
**Cultural Background:** None provided.

**B. STUDY DESIGN:**

**1. Experimental Conditions**

a) **Range-finding Study:** None performed.

b) **Definitive Study**

Table 1 . Experimental Parameters/Design

Parameter	Value	Remarks Criteria
<u>Acclimation:</u>		O.K.
Duration:	Held under test conditions from delivery of eggs.	
Feeding:	Mixture of pine and birch pollen (3:1) ad libitum; water provided by capillary action.	
Health of mites	Not reported.	





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Parameter	Value	Remarks ----- Criteria
Cage - description and size	<p>Test units formed from glass cover slides glued together, with a barrier of sticky material to keep the mites on the test arena.</p> <p>Test container consists of plastic trays (11 x 11 x 6 cm) with a foam rubber and a glass plate on top covered by tissue paper (in contact with water)</p>	<p>O.K.</p> <p>-----</p> <p>Glass coffin cells recommended.</p>
<p><u>Test conditions</u></p> <p>Temperature: Humidity:     acclimatisation:     exposure: Lighting: Photoperiod:</p>	<p>Test units held in a ventilated climatic chamber</p> <p>24 - 26°C</p> <p>70 - 85%</p> <p>55 - 90%</p> <p>330 - 680 lux</p> <p>16 h L: 8 h D</p>	<p>O.K.; due to technical reasons, RH dropped to &lt;60% (min. 55%) on Day 3 for ~1 h.</p> <p>-----</p> <p><i>From Overmeer (1988):</i></p> <p><u>Temperature:</u> <i>Overmeer (1988): 25°C</i> <i>Bakker et al. (1992): 25 ± 1°C</i></p> <p><u>Humidity:</u> <i>Overmeer (1988): 80% RH</i> <i>Bakker et al. (1992): 85 ± 5% RH</i></p> <p><u>Lighting:</u> <i>Overmeer (1988): 16h L: 8h D</i> <i>Bakker et al. (1992)</i></p>
<p><u>Solvent/dispersant control, if used</u></p> <p>Name: Concentration:</p>	<p>none.</p>	<p>-----</p>
Number of mites per test unit	20	<p>O.K.</p> <p>-----</p> <p><i>Bakker et al. (1992) requires 20 mites per test unit</i></p>

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Parameter	Value	Remarks Criteria
<u>Number of replicates per treatment</u> Negative control: Solvent/dispersant control, if used: Treated: Positive control:	3 - 3 3	<5 replicates used. ----- <i>Bakker et al. (1992) and Blumel et al. (1999) require 5 test units (replicates) per treatment</i>
<u>Doses used</u> Nominal:  Measured:	0 (negative control), 56, 112, 225, 450 and 675 mL/ha  = 0, 19.7, 39.4, 79.1, 158.2 and 237.3 g a.i./ha (based on measured purity)  Not measured.	Proposed field application rate = 23 g a.i./ha
Deposition rate	2 mg/cm <sup>2</sup> (corresponding to 200 L spray liquid/ha)	O.K. lab track sprayer used with TeeJet 8002 EVS at 2.2 bar and 2 km/h spraying speed.  ----- <i>Overmeer (1988): 2 mg/cm<sup>2</sup></i> <i>Blumel (1999): 1 mg/cm<sup>2</sup></i>
Duration of the study	14 days	O.K.  ----- <i>Blumel (1999): Day 0-7 mortality assessment, Day 7-14 reproductive assessment</i>
Indicate other factors, if any		
<u>Reference chemical, if used</u> Name: Concentration:	Perfekthion EC (400 g/L dimethoate) 9 mL/ha in 200 L water (corresponding to 45 µL Perfekthion/L, or 0.018 g/L dimethoate)	O.K.  <i>Blumel (1999): Dimethoate 400 EC at a rate of between 9 and 15 mL/ha</i>







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**2. Observations:**

Table 2: Observations

Parameters	Details	Remarks ----- Criteria
Parameters measured including sublethal effects/toxicity symptoms	-Mortality (= number of dead and escaped mites, corrected for mortality in solvent controls) -Sex-ratio (target ratio 1 male: 5 females) -Reproduction (no. of eggs laid, and no. of live and dead juvenile stages per female)	O.K. Mortality in negative control was <20% after 1 week.  Mean reproduction rate was 8.7 eggs per female.  Sex ratio was adopted on Day 9 instead of Day 7 due to human error - authors claim no effect on study. <i>Blumel et al. (1999): Luis and Ufer (1995) require control mortality less than 20%, and greater than 4 eggs per female in the controls.</i> <i>Blumel et al. (1999): 1 m:5 f</i>
Observation intervals	-Mortality: Days 3, 7 -Sex ratio: Day 7 -Reproduction: Days 7, 10, 12 and 14	-----
Were raw data included?	Yes	
Other observations, if any		

**II. RESULTS AND DISCUSSION:**

**A. MORTALITY:**

Mite mortality of the parental generation was determined for the first week after exposure. Mean mortality in negative controls by Day 7 was  $13.3 \pm 2.9\%$ , which meets the validity criteria of <20%. There was an increasing trend in Day 7 control-corrected mortality in test concentrations up to 158.2 g a.i./ha, however mortalities in none of the treatment groups was significantly different from controls (Fisher's Exact test,  $p > 0.05$ ). Mortality in the positive control was 98.3





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± 2.9% after 3 days of exposure and 100% by Day 7.

Table 3: Effect of BAS670 00 H on cumulative mortality of predatory mites (*T. pyri*).

Treatments (g a.i./ha) [nominal conc.]	No. of mites	% Mortality during observation period (Mean ± S.D.)		
		Day 3	Day 7	Corrected Day 7*
0 (Negative control)	60	11.7 (5.8)	13.3 (2.9)	-
0.018 g/L dimethoate (Positive control)	60	98.3 (2.9)	100.0 (0.0)	-
19.7	60	0.0 (0.0)	10.0 (5.0)	-3.8
39.4	60	6.7 (7.6)	15.0 (5.0)	2
79.1	60	5.0 (5.0)	20.0 (13.2)	7.7
158.2	60	11.7 (7.6)	21.7 (5.8)	9.7
237.3	60	8.3 (2.9)	18.3 (10.4)	5.8
NOEC	237.3 g a.i./ha			
LR <sub>50</sub>	>237.3 g a.i./ha			
Reference chemical	LC <sub>50</sub>	<0.018 g/L dimethoate		
	NOEC	<0.018 g/L dimethoate		

Note: Mortality data does not include escapees.

\*Day 7 mortality for test substance corrected for negative controls:  $M\% = (t-c)/(100-c) * 100\%$ , where M = % corrected mortality, t = % mortality of test group, and c = % mortality of controls.

**B. SUB-LETHAL TOXICITY EFFECTS:**

In all treatment levels except the positive control (100% mortality), egg production started at Day 7 after test initiation. There was no significant difference in egg production per female between mites exposed to BAS 670 00 H at concentrations up to 237.3 g a.i./ha and those exposed to the negative control (Dunnett's test,  $p > 0.05$ ). Mean reproduction in the negative control ( $8.7 \pm 1.5$ ) exceeded the test validity requirement of 4.0 eggs per female from Day 7 to Day 14 (Blumel et al. 1999).





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Table 4: Effect of BAS 670 00 H on reproduction rate (*Rtr*) of the predatory mite, *T. pyri*.

	Day 14 reproduction rate ( <i>Rtr</i> ) of mites (No. of eggs/female).				
	Test substance (79.1 g a.i./ha)	Test substance (158.2 g a.i./ha)	Test substance (237.3 g a.i./ha)	Negative control (0 g a.i./ha)	Positive control (0.018 g/L dimethoate)
Unit 1	8	9.7	9.5	7	-
Unit 2	11	9.8	8.8	9.5	-
Unit 3	6.1	3.9	10.4	9.6	-
Mean (±S.D.)	8.4 (2.5)	7.8 (3.4)	9.6 (0.8)	8.7 (1.5)	-
Total Effect (E)%	10.9	19	-3.9%	-	-
<u>Reference chemical</u>	LC <sub>50</sub>	<0.018 g/L dimethoate			
	NOEC	<0.018 g/L dimethoate			

*Rtr* = the sum of the number of eggs produced per female during the reproduction period from Day 7 to Day 14.

**C. REPORTED STATISTICS:**

Mortality data were analysed for significance using Fisher's Exact test (two-sided,  $p = 0.05$ ). Reproduction data were tested for normality and homogeneity of variance using the R/s-test ( $p = 0.05$ ) and Cochran-test ( $p = 0.05$ ), respectively, and significant differences were analysed by Dunnett's test (two-sided,  $p = 0.05$ ).

**D. VERIFICATION OF STATISTICAL RESULTS BY THE REVIEWER:**

Statistical results were not verified by USEPA as they concluded that the analyses appeared to be valid. The PMRA reviewer found that a Chi-square test was more appropriate for the given sample sizes. No significant differences to the control were found ( $p \leq 0.337$ ). The study authors did not calculate the Total Effect (E) on predatory mites, so this was done by the PMRA reviewer according to the equation of Bakker et al. (1992):

$$E = 100\% - (100\% - Ma) \times Er$$

where Ma = Abbott's corrected mortality (already provided by study authors)

Er = effect on reproduction

= reproduction in treated group ÷ reproduction in control group





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**E. STUDY DEFICIENCIES:**

1) The male:female sex ratio was >1:5 in nearly all test units, however, this did not adversely effect the outcome of the study, as reproduction in control units was adequate. 2) Only three replicates were run in the study instead of the required five. This does not appear to have compromised the validity of the study however, as there was relatively little variation among the replicates.

**F. REVIEWER'S COMMENTS:**

The actual application rates were not verified (only nominal values were reported), and the stability of BAS 670 H (a.i.) was not assessed under actual use conditions during the 2-week exposure period.

**G. CONCLUSIONS:**

This study is acceptable, and satisfies the guideline requirement for conditionally required data under DACO 9.2.5. The USEPA determined that this study is scientifically sound; however, it was not designed to fulfill any current U.S. EPA FIFRA guideline. This study provides useful information on the acute toxicity of BAS 670 00 H (containing 31% a.i.) to the parasitic mite, *Typhlodromus pyri*. Exposure of predatory mites (*Typhlodromus pyri*) to BAS 670 00 H at nominal concentrations of up to 237.3 g a.i./ha did not result in significant mortality or reproductive effects in mites. According to the IOBC classification scheme (Bakker 1992), BAS 670 00 H can be classified as Category 1 (harmless) to *Typhlodromus pyri*.

**III. REFERENCES:**

Bakker, F., A. Grove, S. Blümel, J. Calis and P. Oomen. 1992. Side-effect tests for phytoseids and their rearing methods. IOBC/WPRS Bulletin, 15(3): 61-81.

Blümel, S., B. Baier, F. Bakker, K. Brown, M. Candolfi, K. Nienstedt, A. Goßmann, K. J. Schirra, A. Ufer, and A. Waltersdoerfer. 1999. Laboratory residual contact test with the predatory mite *Typhlodromus pyri* Scheuten for regulatory testing of plant protection products; 3<sup>rd</sup> draft version (current improvements of the ring test group).

Approved 04/01/01 C.K.