Data Evaluation Report on the toxicity of BAS 670 00 H to the predator lacewing, *Chrysoperla carnea.*
PMRA Submission Number 2003-0839 **EPA MRID Number 45901817**

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-iosoxazol-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 **Signature:**
PMRA **Date:** September 02, 2004

Secondary Reviewer: Stephen Carey, Biologist **Signature:**
EPA **Date:** February 24, 2005

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

CITATION: Drexler, A. 2000. Effect of BAS 670 00 H on the lacewing *Chrysoperia carnea* Steph. (Neuroptera, Chrysopidae) in the laboratory. IBACON, Germany. Study No. 7622046. BASF Corp. Registration No. 2000/1014946. Submitted to PMRA on March 31, 2003.

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EXECUTIVE SUMMARY:

The effect of BAS 670 00 H (guarantee 351.6 g BAS 670 H/L, equivalent to 31% a.i.) on mortality and reproductive effects in the green lacewing (*Chrysoperla carnea*) was determined over a 26 day period. Dose rates for BAS 670 00 H were 0 (water control), 11.25, and 225 mL/ha (or, 0, 3.95, and 79.1 g a.i./ha), which exceeds the recommended label dose rate is 73 mL/ha. Tests were conducted according to the protocol of Bigler (1988). A single application of each test substance was made to the appropriate test chambers at a rate of 2 mg/cm^3 (= 200 L spray liquid/ha). After the spray had dried for ~1 hour, lacewing larvae 2 -3 days old were introduced, and were exposed to water control, test substance, or toxic standard (positive control [dimethoate]). During the 26-day exposure period, 50 individuals (replicates) were exposed per treatment group. During the oviposition period beginning on Day 18, 2 units (considered as one replicate) were exposed per treatment group. Mortality of larvae and pupae was assessed daily, and fecundity (eggs/female/day) and fertility (hatching rate) were determined for 2 periods of 24 h each. The following test validity criteria were met: control mortality = 16% (20% maximum), mean control reproduction = 32.4 eggs/female (minimum 15 eggs/female/day), mean control fertility = 81.6% (minimum 70% larval hatching rate) and toxic standard mortality = 70% (required range of 50 - <100%).

Control-corrected mortality in lacewings were -4.8 and -9.5% at 3.95 and 79.1 g a.i./ha, respectively. Mortality in the treatments did not differ significantly from negative controls (Fischer exact-test, $p > 0.05$). By Day 14, there was no difference in mean daily egg production per female between lacewings exposed to BAS 670 00 H (34.3 ± 0.5 and 32.5 ± 1.4 eggs per day per female at 3.95 and 79.1 g a.i./ha, respectively), and those exposed to the negative control (mean = 32.4 ± 2.0). Lacewing fertility (i.e., mean larval hatching rate) at 3.95 and 79.1 g a.i./ha (76.8 ± 4.1 and 77.9 ± 7.5%, respectively) did not differ substantially from controls (81.6 ± 7.5%).

The beneficial capacity of predatory lacewings (E) was reduced by -10.9 and -9.8% compared to the negative control at concentrations of 3.95 and 79.1 g a.i./ha. According to the IOBC classification scheme (Bakker et al. 1992), BAS 670 00 H can be categorized as Category 1, Harmless to *Chrysoperla carnea*.

This study is classified as acceptable and satisfies the conditional guideline requirement for an acute toxicity study with a beneficial terrestrial invertebrate predator (PMRA 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 requirements. The study is scientifically sound and provides useful information on the sub-chronic toxicity of the end-use product BAS 670 00 H (31% a.i.) to the predatory lacewing, *Chrysoperia carnea.*

Results Synopsis

Total Effect (E): <0%
LR_{50}: >225 mL/ha (>79.1 g a.i./ha or >0.07 lb ai/A)
NOER (mortality and reproduction): 225 mL/ha (79.1 g a.i./ha or 0.07 lb ai/A)
Endpoints Effected: none

I. MATERIALS AND METHODS

GUIDELINE FOLLOWED: This study was designed to comply with the method for testing side-effects of pesticides on larvae of the green lacewing, *Chrysoperla carnea* Steph. (Neuroptera, Chrysopidae), (Bigler 1988) with current improvements in the ring-test group. The following deviation from the Bigler guidance was noted: temperature was temporarily outside of the 24 ± 2°C criteria (minimum of 21°C) for approximately 1 - 2 hours on Day 5. No adverse effect on the study is expected from this deviation. This study was not designed to fulfill any current U.S. EPA guideline.

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.

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), in the dark

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_2O at 20°C >100 g/L at pH >9	Highly soluble
Vapour pressure	$<1.0 \times 10^{-12}$ mbar (= $<1.01 \times 10^{-10}$ 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

2. Test organism:

Species:	Lacewings (*Chrysoperla carnea* Steph.)
Age at test initiation:	2-3 day old larvae
Source:	IBACON GmbH, Arheilger Weg 17, D-64380 Rossdorf.
Stage Transported:	Not provided
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*
Acclimation:		O.K.
Duration:	2-3 days under test conditions	
Feeding:	larvae: fresh *Sitotroga cereallela* eggs ad libitum adults: artificial diet ad libitum and tap water	
Health of lacewings	Not reported.	

Parameter	Value	Remarks *Criteria*
Cage - description and size	Exposure cages: 3 treated glass plates (51 x 44 x 17 x 44 cm) covered with acrylic glass plate with holes for acrylic glass cylinders treated with Fluon. Post-exposure cages: Emergence period - plastic boxes (18.3 x 13.6 x 6 cm) Pre-oviposition and oviposition period - an acrylic cylinder (15 cm high x 10 cm diameter) with a cotton net on top for egg laying and a cotton plug on bottom to wick water.	O.K.
Test conditions Temperature: acclimatisation: exposure: post-exposure: Humidity: acclimatisation: exposure: post-exposure: Lighting: acclimatisation: exposure: post-exposure: Photoperiod:	Test units held in a ventilated climatic chamber 24 - 24°C 22 - 25°C 21 - 25°C 60 - 70% 65 - 75% 60 - 75% 2930 lux 2780 - 3540 lux 2500 - 3310 lux 16 h L: 8 h D	O.K.

Parameter	Value	Remarks *Criteria*
Solvent/dispersant control, if used Name: Concentration:	none.	
Number of predators per test unit	exposure period: 1 larvae per test unit x 50 units	O.K., 50 larvae per treatment group
Number of replicates per treatment Negative control: Solvent/dispersant control, if used: Treated: Positive control:	Oviposition period: 2 - 2 2	Oviposition period: Test item rate 1: Unit 1: 13 m + 10 f Unit 2: 11 m + 9 f Test item rate 2: Unit 1: 11 m + 13 f Unit 2: 9 m + 12 f Control: Unit 1: 12 m + 9 f Unit 2: 12 m + 8 f
Doses used Nominal: Measured:	0 (negative control), 11.25 and 225 mL/ha = 0, 3.95 and 79.1 g a.i./ha (based on measured purity) Not measured.	O.K. Proposed field application rate = 25 g a.i./ha
Deposition rate	2 mg/cm^2 (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. *Overmeer (1988): 2 mg/cm^2* *Blumel (1999): 1 mg/cm^2*

Parameter	Value	Remarks *Criteria*
Duration of the study	Exposure period: 15 - 26 days Pre-oviposition period: 5 - 10 days (time from adult hatch to start of oviposition) Oviposition period: 7 days w/ 2 checks	O.K.
Indicate other factors, if any		
Reference chemical, if used Name: Concentration:	 Perfekthion EC (400 g/L dimethoate) 35 mL/ha in 200 L water (corresponding to 175 µL Perfekthion/L, or 0.07 g/L dimethoate)	O.K.

2. Observations:

Table 2: Observations

Parameters	Details	Remarks *Criteria*
Parameters measured including sublethal effects/toxicity symptoms	-Mortality (no. of living and dead larvae and no. of cocoons formed) -Reproduction (no. of eggs laid/female/day, and larval hatching rate)	O.K. Mortality in negative control was <20% after 1 week. Mean reproduction rate was >15 eggs per female per day. Fertility (mean larval hatching rate) was >70%. *Bigler (1988): require control mortality less than 20%, greater than 15 eggs per female in the controls, and more than 70% hatching rate for larvae.*

Parameters	Details	Remarks *Criteria*
Observation intervals	-Mortality: Daily -Reproduction: First assessment done 7 days after first egg laying; egg numbers were counted twice within one week; hatched larvae removed and counted daily	
Were raw data included?	Yes/No	Raw data were not provided for reproductive parameters, therefore stats were not run on these parameters.
Other observations, if any		

II. RESULTS AND DISCUSSION:

A. MORTALITY:

Cumulative mortality of the larvae and pupae (50 per treatment group) after 26 days exposure to dried spray residue was 12.0 and 8.0% at 3.95 and 79.1 g a.i./ha, respectively. Mortality in negative controls by Day 26 was 16.0%, which meets the validity criteria of <20%. Control-corrected mortality rates (c.f. Abbott 1925; with improvements by Schneider-Orelli, 1947) were -4.8 and -9.5% at 3.95 and 79.1 g a.i./ha, respectively. Mortalities in the treatment groups were not significantly different from controls (Fisher's Exact test, $p > 0.05$). Mortality in the positive control was 70.0% by Day 26.

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 ± 1.5) exceeded the test validity requirement of 4.0 eggs per female from Day 7 to Day 14 (Blumel et al. 1999).

Table 3: Effect of BAS 670 00 H on reproduction rate of the predatory lacewings.

	Test substance (3.95 g a.i./ha)	Test substance (79.1 g a.i./ha)	Negative control (0 g a.i./ha)
Living lacewings (oviposition start)	43	45	41
Living females (oviposition start)	19	25	17
No. eggs per female (Check 1)	33.9	31.5	33.8
No. eggs per female (Check 2)	34.6	33.5	31
Hatching rate (Check 1)	79.7	83.2	86.9
Hatching rate (Check 2)	73.9	72.6	76.3
Mean no. eggs per female (±S.D.)	34.3 (0.5)	32.5 (1.4)	32.4 (2.0)
Total Effect (E) %	-10.9	-9.8	-
Mean larval hatching rate (%) (±S.D.)	76.8 (4.1)	77.9 (7.5)	81.6 (7.5)

Table shows the sum of the two reproduction units, the tabulated results represent rounded values calculated on the exact raw data.

C. REPORTED STATISTICS:

Mortality data were analysed for significance using Fisher's Exact test (two-sided, $p = 0.05$). Reproduction data were graded against the following criteria: if the mean number of eggs/female/day was ≥ 15 and the mean hatching rate was ≥ 70% in the treated variant, this indicates that there is no negative effect of the test item on reproductive performance of *C. carnea*.

D. VERIFICATION OF STATISTICAL RESULTS BY THE REVIEWER:

The PMRA reviewer verified that there were no significant differences between treatment mortalities and the control (Fisher's exact test; $p \geq 0.239$). The study authors did not statistically evaluate the effect on reproductive effort, however, given that the mean number of eggs per female in the two test material treatments were equal to or slightly higher than the control average, the PMRA reviewer agrees that no effects occurred. The mean larval hatching rates in the two test material treatments were only reduced by ≤5.9% relative to controls. The reviewer agrees that this does not constitute a significant reduction in fertility.

The study authors did not calculate the Total Effect (E) on lacewings, so this was done by the reviewer according to the equation of Bakker et al. (1992):

E = 100% - (100% - Ma) x Er
where Ma = Abbott's corrected mortality (already provided by study authors)
Er = effect on reproduction
= reproduction in treated group ÷ reproduction in control group

E. STUDY DEFICIENCIES:

Only two replicates were run at each treatment level for the oviposition portion of the test. This precluded a statistical analysis of the data. However, the CV around the two check periods was low, suggesting little variation between replicates. The lack of biological effects seen at the two treatment levels appears to be valid.

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 exposure period. US EPA did not conduct a statistical analysis since the EPA reviewer agrees with PMRA reviewer's conclusions.

G. CONCLUSIONS:

This study is acceptable, and satisfies the Canadian guideline requirement for conditionally required data under DACO 9.2.5. The USEPA concludes that this study is scientifically sound; however, it was not designed to fulfill any current U.S. EPA FIFRA guideline. The study provides useful information on the sub-chronic toxicity of BAS 670 00 H (containing 31% a.i.) to the predatory lacewing, *Chrysoperla carnea.* Exposure of predatory lacewings (*Chrysoperla carnea*) to BAS 670 00 H at nominal concentrations of up to 79.1 g a.i./ha or 0.07 lb ai/A did not result in significant mortality or reproductive effects. According to the IOBC classification scheme (Bakker 1992), BAS 670 00 H can be classified as Category 1 (harmless) to *Chyrsoperla carnea.*

III. REFERENCES:

Abbott, W.S. 1925. A method of computing the effectiveness of an insecticide. J. Econ. Entomol. 18: 265 - 267.

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.