98/8 Doc IIIA section No. 7.5.4.1/21	Acute toxicity to honey bees and other beneficial arthropods, for example predators
91/414 Annex Point addressed	Other arthropods

		Official use only
Reference point (location) in dossier	**7.5.4.1/21**	
Title:	A laboratory test to determine the effects of *lambda*-Cyhalothrin 50 g/kg WG (YF8048A) on the parasitoid, *Aphidius rhopalosiphi*	
Project/Report number:	ZEN-98-3/C	
Author(s):	Mead-Briggs, M.A.	
Date of report:	1999	
Published:	Not published	
Testing facility:	Agrochemical Evaluation Unit, University of Southampton, Southampton, UK	
Test substance:	*lambda*-Cyhalothrin WG formulation, 5.32% w/w	
Study dates	15 January – 01 February 1999	
GLP:	Y	
Deficiencies:	None	
Reliability indicator	1	

	Official use only
Materials and methods: 50 g/kg WG formulation (YF8048A), *lambda*-Cyhalothrin content of 5.32% w/w. Adults of the parasitoid wasp *Aphidius rhopalosiphi* were exposed to fresh residues of a 50 g/kg WG formulation of *lambda*-Cyhalothrin (YF8048A) applied to glass plates in a dose-response test. The effects of *lambda*-Cyhalothrin applied at an equivalent rates of 0.125, 0.3, 0.5, 1.0 and 1.5 g a.s./ha were assessed. Three replicates exposure units were used for each treatment, containing 10 wasps each, with at least five females per replicate. The percentage "mortality" of wasps (derived from the numbers of insects left moribund or dead after 48 hours) was used to generate LC_{30} and LC_{50} values using a probit analysis. A water control and toxic reference treatment (formulated dimethoate at 0.17 g a.s./ha) were included in the test. To assess effects on fecundity, female wasps from the control and lowest two treatment rates of *lambda*-Cyhalothrin (15 wasps per treatment) were removed from the residue exposure chambers and individually confined over pots of untreated, aphid-infested barley for 24 hours. The wasps were then removed and the number of parasitised aphid mummies that developed was recorded 10 days later. **Findings:** The 48 hour LR_{30} and LR_{50} values for *lambda*-Cyhalothrin, formulated as a 50 g/kg WG, were calculated to be 0.42 and 0.59 g a.s./ha, respectively. There were no control mortalities.	

There was 100% mortality in the dimethoate treatment within 24 hours of test start. In the fecundity assessments, the mean number of mummies per female were 24.1, 15.3 and 6.1 for the control, 0.125 and 0.3 g a.s./ha treatments of *lambda*-Cyhalothrin, respectively. Both *lambda*-Cyhalothrin treatments differed significantly from the control (t-tests, $P<0.05$ and 0.001, respectively). The LR_{50} value for *lambda*-Cyhalothrin, as a 50 g/kg formulation, to *A. rhopalosiphi* under laboratory worst-case test conditions was 0.59 g a.s./ha.	

	Evaluation by Competent Authorities
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	Not relevant
Materials and Methods	[redacted]
Results and discussion	
Conclusion	[redacted].
Reliability	
Acceptability	
Remarks	

98/8 Doc IIIA section No.	7.5.4.1/22	Acute toxicity to honey bees and other beneficial arthropods, for example predators
91/414 Annex Point addressed		Other arthropods

		Official use only
Reference point (location) in dossier	**7.5.4.1/22**	
Title:	*Lambda*-Cyhalothrin: A laboratory test on four beneficial arthropod species	
Project/Report number:	TMJ3456B	
Author(s):	Yearsdon, H.A. and Farrelly, L.C.	
Date of report:	1996	
Published:	Not published	
Testing facility:	Jealott's Hill Research Station, Zeneca Agrochemicals, Bracknell, UK	
Test substance:	*lambda*-Cyhalothrin, purity [redacted]	X1
Study dates	May – June 1995	
GLP:	No	X2
Deficiencies:	None	
Reliability indicator	1	

	Official use only
Materials and methods: *Lambda*-Cyhalothrin analytical standard (ASJ10012-01S), purity [redacted] w/w. Technical *lambda*-Cyhalothrin was formulated in 5% acetone in deionised water solution and applied to leaves or plants at a range of concentrations chosen to allow determination of an LC_{50} for each test species. Test concentrations were all applied in a volume of 200 L/ha. The test species were: *Orius laevigatus* adults; *Aphidius rhopalosiphi* adults; *Encarsia formosa* protected life-stage; and *Phytoseiulus persimilis* adults. *Orius* and *Aphidius* were exposed to fresh dried residues only (*Orius* on French bean leaf discs and *Aphidius* on barley plants); *Encarsia* were exposed by spray contact only (on French bean leaf discs); *Phytoseiulus* were tested with exposure to fresh dried residues only, and direct contact exposure to spray plus exposure to the dried residues (both on French bean leaf discs). **Findings:** For technical *lambda*-Cyhalothrin applied to natural leaf surfaces, LR_{50} values for residual exposure of adult organisms were found to be: 28.2 mg a.s./ha for *O. laevigatus*; >160 mg a.s./ha (the highest rate tested) for *A. rhopalosiphi*; 13.0 mg a.s./ha for *P. persimilis*. The LR_{50} for *P. persimilis* adults exposed by contact and residual routes was 8.2 mg a.s./ha. The LR_{50} for the protected life-stage of *E. formosa* exposed by the contact route was 234.2 mg a.s./ha. Results of the tests are compiled in the table below.	

Effects on four beneficial arthropod species following exposure to sprayed *lambda*-Cyhalothrin residues on leaf surfaces

Species (life stage tested)	Exposure route	Days after treatment	LC_{50} (mg ai/L)	95% confidence intervals	equivalent LR_{50} (mg ai/ha)
Orius laevigatus (adults)	Residual exposure only	4	0.141	0.115 - 0.172	28.2
Aphidius rhopalosiphi (adults)	Residual exposure only	4	>0.8[a]	-	>160
Encarsia formosa (protected life-stage)	Contact exposure only	14	1.171	0.519 - 71.282	234.2
Phytoseiulus persimilis (adults)	Residual exposure only	4	0.065	0.052 - 0.082	13.0
	Contact plus residual exposure	4	0.041	0.022 - 0.060	8.2

[a] 5% mortality at the highest rate tested (0.8 mg *lambda*-Cyhalothrin/L spray solution)

Evaluation by Competent Authorities	
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	Not relevant
Materials and Methods	[redacted]
Results and discussion	[redacted]
Conclusion	[redacted]
Reliability	[redacted]
Acceptability	[redacted]
Remarks	

98/8 Doc IIIA section No. 7.5.4.1/23	**Acute toxicity to honey bees and other beneficial arthropods, for example predators**
91/414 Annex Point addressed	**Other arthropods**

		Official use only
Reference point (location) in dossier	**7.5.4.1/23**	
Title:	PP321: Laboratory LD_{50} test on the aphid pest *Rhopalosiphum padi* and a range of its enemies	
Project/Report number:	RJ0686B	
Author(s):	White, J.S., Boersma, A.H.R. and Brown, R.A.	
Date of report:	1989	
Published:	Not published	
Testing facility:	Jealott's Hill Research Station, Zeneca Agrochemicals, Bracknell, UK	
Test substance:	*lambda*-Cyhalothrin, purity [redacted]	X1
Study dates	May – June 1995	
GLP:	Yes	
Deficiencies:	None	
Reliability indicator	1	

	Official use only
Materials and methods: Each of three technical materials *lambda*-Cyhalothrin, dimethoate and methomyl were tested on eight arthropods. These were one pest species; the aphid *Rhopalosiphum padi*, and six natural enemies; the carabid beetle *Trechus quadristriatus*, three common linyphiid spiders; *Lepthyphantes* spp (both females and males), *Bathyphantes* spp. (females) and *Oedothorax* spp. (males), a syrphid *Episyrphus balteatus* (Diptera : Syrphidae) and a parasite *Dacnusa sibirica* (Hymenoptera : Braconidae). The design was three replicates of ten individuals for beetles, syrphids and parasites. For the aphids, there were six replicates of five individuals and for the linyphids, there were four replicates of ten individuals (each replicate comprising a different genus). A range-finder test was performed for each species/chemical combination. A control group was dosed with the solvent (acetone or butanone alone). Based on the range-finder test, 6 to 12 dose levels were chosen within which the LD_{50} was expected to fall. For each species a control group was dosed with solvent alone. Mortality and knockdown assessments were made 2, 4, 6, 24, 48, 72 and 144 hours after treatment for the beetles and spiders and at 2, 4, 24, 48 and 72 hours for the syrphid larvae and adult parasites. The relative toxicity of the compound to the predators was compared by calculating a selectivity ratio, the LD_{50} of the natural enemy divided by that of the pest (Stevenson *et al*, 1984). The higher the ratio the more selective the compound is to the beneficial/pest combination. **Findings:** *Lambda*-Cyhalothrin was more selective than the broad-spectrum organophosphate,	X2 X3

dimethoate, and the broad spectrum carbamate, methomyl, to three of the four natural enemy groups tested. The results for 72 hour LD_{50}s and selectivity ratios are tabulated below.	

Effects of *lambda*-Cyhalothrin on *R. padi* aphids and six natural enemies, compared to two other insecticides

Species	Treatment	LD_{50} (µg a.s./g)	Selectivity Ratio
Rhopalosiphum padi (Aphid)	*Lambda*-Cyhalothrin	0.00275	-
	Methomyl	0.442	-
	Dimethoate	0.935	-
Lepthyphantes spp. (f) (Spider)	*Lambda*-Cyhalothrin	0.149	54.0
	Methomyl	41.3	93.3
	Dimethoate	168	180
Lepthyphantes spp. (m) (Spider)	*Lambda*-Cyhalothrin	0.097	35.4
	Methomyl	39.2	88.7
	Dimethoate	58.3	62.3
Oedothorax spp (m) (Spider)	*Lambda*-Cyhalothrin	0.061	22.1
	Methomyl	400	905
	Dimethoate	53.9	57.7
Bathyphantes spp (f) (Spider)	*Lambda*-Cyhalothrin	0.0115	4.19
	Methomyl	3.65	8.26
	Dimethoate	51.7	55.3
Episyrphus balteatus (Hover fly larvae)	*Lambda*-Cyhalothrin	>2170	791000
	Methomyl	4.12	9.52
	Dimethoate	0.966	0.667
Trechus quadristriatus (Beetle)	*Lambda*-Cyhalothrin	22.3	8100
	Methomyl	5.53	12.5
	Dimethoate	14.6	15.6
Dacnusa sibirica (Parasite)	*Lambda*-Cyhalothrin	6.92	2520
	Methomyl	2.3	5.2
	Dimethoate	3.26	3.48

m: male;
f: female.

Evaluation by Competent Authorities	
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	Not relevant
Materials and Methods	[redacted]
Results and discussion	[redacted]
Conclusion	[redacted]

Reliability	[redacted]
Acceptability	
Remarks	

98/8 Doc IIIA section No. 7.5.4.1/24	Acute toxicity to honey bees and other beneficial arthropods, for example predators
91/414 Annex Point addressed	Other arthropods

		Official use only
Reference point (location) in dossier	**7.5.4.1/24**	
Title:	*Lambda*-Cyhalothrin: Investigation into the Toxicity of a 5% WG Formulation to the Larvae of the Hoverfly *Episyrphus balteatus* De Geer.	
Project/Report number:	RJ1399B	
Author(s):	Deprez, C. and McMullin, L.C.	
Date of report:	1993	
Published:	Not published	
Testing facility:	Jealott's Hill Research Station, Zeneca Agrochemicals, Bracknell, UK	
Test substance:	*lambda*-Cyhalothrin, WG formulation 5.0%	
Study dates	20 October – 30 November 1992	
GLP:	Y	
Deficiencies:	None	
Reliability indicator	1	

	Official use only
Materials and methods: In a second study *lambda*-Cyhalothrin (formulated as a 5% WG), dimethoate (positive control) and deionised water (untreated control) were each applied to 30 separate replicate glass slides per treatment. *Lambda*-Cyhalothrin and dimethoate were applied at respective rates of 9.0 g a.s./ha and 52 g a.s./ha. After spraying, the glass microscope slides were left to dry at ambient room temperature before the test cages were assembled and the larvae introduced. For each treatment, 30 *Episyrphus balteatus* larvae were exposed to fresh, dry residues of pesticide applied to glass microscope slides. Individuals were held separately to prevent cannibalism. Once the larvae had pupated, the treated glass surfaces were replaced with clean glass slides; this prevented any residual toxicity to the adults as they emerged from the pupae. Mortality of the larvae and the fecundity of the resulting adults in the treated groups were compared to the control. Adults emerging from pupae formed from the treated larvae were transferred to breeding cages for fecundity assessments. Fecundity assessments for females in both the *lambda*-Cyhalothrin treatment and the control began 6 days after emergence of the first adults and continued for three weeks. An oviposition site containing 6 aphid-infested dwarf broad bean seedlings was placed in each breeding compartment. The oviposition site was replaced every three days and the total number of eggs laid recorded. The number and sex of the adults in each breeding cage was also recorded. Throughout the study, the test system was maintained under controlled conditions (20°C ± 5°C, 40-95% relative humidity, 16 hour light: 8 hour dark	

photoperiod).

The overall treatment effects were then used to determine the IOBC effect categories for *E. balteatus* larvae according to Hassan, 1992:

- Category 1 : Harmless — Effect <30% =
- Category 2 : Effect = 31% - 79% = Slightly Harmful
- Category 3 : Effect = 80% - 99% = Moderately Harmful
- Category 4 : Harmful. Effect = > 99% =

Findings:
The effects of *lambda*-Cyhalothrin (9.0 g a.s./ha) in the laboratory on survival, metamorphosis and fecundity of *Episyrphus balteatus* larvae, following exposure to residues are given in the table below.

Following treatment with *lambda*-Cyhalothrin at 9.0 g ai/ha, larval mortality of 27% (corrected for control mortality) was observed. However, in accordance with the IOBC Classification Scheme, the overall effect of the pesticide on the predator is calculated taking in to account pre-imaginal mortality and effects on fecundity. In this case, the overall effect is calculated as 33%. *Lambda*-Cyhalothrin (formulated as a 5% WG) applied at 9.0 g ai/ha is therefore classified as "Slightly Harmful" (Category 2) to *Episyrphus balteatus* larvae in the IOBC Scheme. However, given that the corrected treatment mortality for *lambda*-Cyhalothrin at 9.0 g ai/ha was below the trigger level of 30% and that fecundity was reduced by only 8%, it is concluded that residues of the compound following field application at a rate of 7.5 g ai/ha are not expected to cause adverse effects to the beneficial larval stage of this species.

Effects on *Episyrphus balteatus* following larval exposure to sprayed residues of *lambda*-Cyhalothrin on glass surfaces

Parameter	Control (Deionised Water)	*Lambda*-Cyhalothrin (9.0 g a.s./ha)	Dimethoate (52.4 g a.s./ha)
Number of larvae treated	30	30	30
% Larval mortality at 6 days	3.3	26.7*	100
% Emergence of pupae	86	100	-
Ratio Female : Male	0.9:1	0.9:1	-
Average egg production per female during assessment period	27.5	25.3	-

* Corrected for control mortality

Evaluation by Competent Authorities	
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	Not relevant
Materials and Methods	[redacted]
Results and discussion	
Conclusion	[redacted]
Reliability	
Acceptability	
Remarks	

98/8 Doc IIIA section No.	**7.5.4.1/25**	**Acute toxicity to honey bees and other beneficial arthropods, for example predators**
91/414 Annex Point addressed		**Other arthropods**

		Official use only
Reference point (location) in dossier	**7.5.4.1/25**	
Title:	Laboratory Determination of LC_{50} for PP321 against *Panonychus ulmi* and *Typhlodromus pyri*.	
Project/Report number:	Reference 4	
Author(s):	Solomon, M. G. and Fitzgerald, J.D.	
Date of report:	1989	
Published:	Not published	
Testing facility:	AFRC Institute of Horticultural Research,	
Test substance:	*lambda*-Cyhalothrin, EC formulation 5.0%	
Study dates	07 March 1989	
GLP:	No	
Deficiencies:	None	
Reliability indicator	2	

	Official use only
Materials and methods: *lambda*-Cyhalothrin, formulated as a 5% emulsifiable concentrate and diluted with 0.01% Agral, was applied to the mites *Panonychus ulmi* and *Typhlodromus pyri* on leaf discs, at concentrations of 0 (control), 0.625, 1.25, 2.5, 5.0, 10.0 and 20.0 mg a.s./L and 0 (control), 0.125, 0.25, 0.5, 1.0, 2.0 and 4.0 mg a.s./L, respectively. Agral at 0.01% was used as a non-toxic control. The treated areas were allowed to dry for one hour before *P. ulmi* were transferred onto fresh leaf discs on unsprayed areas, and *T. pyri* were transferred to sub-divided culture plates. The mites were placed in a constant temperature room at 21°C with an 18 hour photo-period and inspected under a stereo-microscope at 24 and 48 hours after treatment to assess mortality. **Findings:** The effects of *lambda*-Cyhalothrin on *P. ulmi* and *T. pyri* are shown in the tables below. Probit analysis of the mortality at 24 hours gave an LC_{50} value for *P. ulmi* of 12.5 mg a.s./L (95% fiducial limits 8.5 to 22.6). The LC_{50} at 48 hours after treatment was 4.8 mg a.s./L (95% fiducial limits 3.8 to 6.2). The LC_{50} at 48 hours after treatment was significantly different from that at 24 hours after treatment. Probit analysis of the mortality at 24 hours gave an LC_{50} value for *T. pyri* of 0.86 mg a.s./L (95% fiducial limits 0.71 to 1.01). The LC_{50} at 48 hours after treatment was 0.49 mg a.s./L (95% fiducial limits 0.39 to 0.60). The LC_{50} at 48 hours after treatment was significantly different from that at 24 hours after treatment.	X1

Effects on *Panonycus ulmi* following exposure to sprayed residues of *lambda*-Cyhalothrin on leaf discs

Lambda-Cyhalothrin concentration (mg/l)	Nos. at transfer		% Mortality at 24 hours	% Mortality at 48 hours
	Alive	Dead		
Control (Agral 0.01%)	49	1	4.1	4.1
0.625	48	2	8.0	8.0
1.25	50	1	17.0	23.4
2.5	47	3	18.0	30.6
5.0	45	5	33.3	53.1
10.0	41	8	52.4	72.1
20.0	40	1	59.0	88

Effects on *Typhlodromus pyri* following exposure to sprayed residues of *lambda*-Cyhalothrin on leaf discs

Lambda-Cyhalothrin concentration (mg/l)	Number of live mites at transfer	% Mortality at 24 hours	% Mortality at 48 hours
Control (Agral 0.01%)	49	8.3	8.3
0.625	51	12.5	22.4
1.25	55	7.3	25.5
2.5	48	54.1	58.3
5.0	53	48.0	72.5
10.0	50	94.0	96.0
20.0	48	98.0	98.0

Evaluation by Competent Authorities	
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	Not relevant
Materials and Methods	[redacted]
Results and discussion	[redacted]
Conclusion	[redacted]
Reliability	[redacted]
Acceptability	[redacted]
Remarks	

98/8 Doc IIIA section No.	7.5.4.1/26	Acute toxicity to honey bees and other beneficial arthropods, for example predators
91/414 Annex Point addressed		Other arthropods

		Official use only
Reference point (location) in dossier	**7.5.4.1/26**	
Title:	*Lambda*-Cyhalothrin: Laboratory test on the effects on the ground beetle *Pterostichus melanarius*	
Project/Report number:	RJ1327B	
Author(s):	Everett, C.J. and Cole, J.F.H.	
Date of report:	1993	
Published:	Not published	
Testing facility:	Jealott's Hill Research Station, Zeneca Agrochemicals, Bracknell, UK	
Test substance:	*lambda*-Cyhalothrin, WG formulation 6.0%	
Study dates	24 August – 24 September 1992	
GLP:	Yes	
Deficiencies:	None	
Reliability indicator	1	

	Official use only
Materials and methods: *Lambda*-Cyhalothrin has been shown, in the studies summarised above, to be safe to populations of predatory ground beetles, syrphid larvae and aphid parasitoids. Significant effects, above the recommended threshold values, have however been observed for Linyphid spiders and predatory mites. Therefore a laboratory study has been conducted in which the additional relevant carabid beetle *Pterostichus melanarius* was treated with *lambda*-Cyhalothrin formulated as a WG formulation, nominally containing 50 g a.s./l. *Lambda*-Cyhalothrin, dimethoate (positive control) and deionised water (untreated control) were each applied to 5 separate replicates per treatment. *Lambda*-Cyhalothrin and dimethoate, both formulated materials made up in deionised water, were applied at respective rates of 7.5 g a.s./ha and 400 g a.s./ha. **Findings:** *Pterostichus melanarius* showed a reduction in mobility (referred to as "knockdown") after application of *lambda*-Cyhalothrin, for up to 7 days. However, between 7 days and the end of the test (28 days) the majority of the beetles appeared healthy and fed normally. Mortality in the *lambda*-Cyhalothrin treated group was not statistically significant when compared to the control. Feeding activity in the *lambda*-Cyhalothrin cages was significantly reduced for 7 days after treatment. Feeding activity for the surviving beetles was 100% from Day 10 through to the end of the test. In the dimethoate treated cages all beetles were dead 10 days after application, thus indicating that the test system was functioning correctly. In the control	

cages, all beetles were healthy and fed normally for the duration of the test. In conclusion, according to the IOBC Classification scheme (Hassan, 1992), Karate 5 WG may be regarded as "Harmless" (mortality <30%, Category 1) to *Pterostichus melanarius*.	

	Evaluation by Competent Authorities
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	Not relevant
Materials and Methods	[redacted]
Results and discussion	
Conclusion	[redacted]
Reliability	
Acceptability	
Remarks	

98/8 Doc IIIA section No. 7.5.4.1/27	Acute toxicity to honey bees and other beneficial arthropods, for example predators
91/414 Annex Point addressed	Other arthropods

		Official use only
Reference point (location) in dossier	**7.5.4.1/27**	
Title:	*Lambda*-Cyhalothrin: Laboratory test on the effects on lycosid spiders	
Project/Report number:	RJ1329B	
Author(s):	Everett, C.J. and Cole, J.F.H.	
Date of report:	1993	
Published:	Not published	
Testing facility:	Jealott's Hill Research Station, Zeneca Agrochemicals, Bracknell, UK	
Test substance:	*lambda*-Cyhalothrin, WG formulation 6.0%	
Study dates	23 September - 7 October 1992	
GLP:	Y	
Deficiencies:	None	
Reliability indicator	1	

	Official use only
Materials and methods: In a further laboratory study the effect of *lambda*-Cyhalothrin formulated as a WG formulation, nominally containing 50 g a.s./l, on lycosid or wolf- spiders was examined. *Lambda*-Cyhalothrin, dimethoate (positive control) and deionised water (untreated control) were each applied to 30 separate replicates per treatment. *Lambda*-Cyhalothrin and dimethoate, each formulation made up in deionised water just prior to treatment, were applied at respective rates of 7.5 g a.s./ha and 400 g a.s./ha. **Findings:** *Lambda*-Cyhalothrin applications at 7.5 g a.s./ha resulted in 90% mortality by the end of the study (14 days after treatment). There was no feeding activity in the *lambda*-Cyhalothrin cages until the final assessment (Day 14) when a single fruit-fly was eaten. In the dimethoate treated cages mortality was 87% by the final assessment, with feeding significantly reduced from day 7. In the control cages all spiders were healthy and fed normally for the duration of the test. In conclusion, according to the IOBC Classification scheme (Reference Hassan, 1992), Karate 5 WG may be regarded as Moderately Harmful (mortality 80 to 99%, Category 3) to lycosid spiders.	

Evaluation by Competent Authorities
EVALUATION BY RAPPORTEUR MEMBER STATE

Date	Not relevant
Materials and Methods	[redacted]
Results and discussion	
Conclusion	[redacted]
Reliability	
Acceptability	
Remarks	

98/8 Doc IIIA section No. 7.5.4.1/28	Acute toxicity to honey bees and other beneficial arthropods, for example predators
91/414 Annex Point addressed	Other arthropods

		Official use only
Reference point (location) in dossier	**7.5.4.1/28**	
Title:	*Lambda*-Cyhalothrin: Laboratory test on the effects of 3 different formulations on predatory lycosid spiders (Lycosidae, Araneae).	
Project/Report number:	RJ1580B	
Author(s):	Busschers, M. and Farrelly, L.C.	
Date of report:	1994	
Published:	Not published	
Testing facility:	Jealott's Hill Research Station, Zeneca Agrochemicals, Bracknell, UK	
Test substance:	*lambda*-Cyhalothrin, WG formulation 5.0% *lambda*-Cyhalothrin, EC formulation 5.0% *lambda*-Cyhalothrin, CS formulation 25.0%	
Study dates	11 – 25 November 1994	
GLP:	Yes	
Deficiencies:	None	
Reliability indicator	1	

	Official use only
Materials and methods: A further laboratory study to assess the effects of three different formulations of *lambda*-Cyhalothrin on lycosid or wolf- spiders has been conducted. *Lambda*-Cyhalothrin, formulated as a 5% WG, a 5% EC and a 25% CS, was used in this study. *Lambda*-Cyhalothrin, dimethoate (positive control) and deionised water (untreated control) were each applied to 30 separate replicates per formulation. *Lambda*-Cyhalothrin and dimethoate, each formulation made up in deionised water just prior to treatment, were applied at respective rates of 7.5 g a.s./ha and 800 g a.s./ha. **Findings:** There were no statistically significant differences in mortality between any of the three *lambda*-Cyhalothrin formulations. However, all formulations and dimethoate produced significantly greater mortality than the control. Exposure of *Pardosa* spp. to dimethoate (applied as a toxic standard at 800 g a.s./ha) resulted in 100% mortality within 24 hours. Exposure of *Pardosa* spp. to treatment with the three *lambda*-Cyhalothrin formulations, resulted in mortality of between 83% and 87% within 14 days of treatment. There was also a clear effect on feeding at all assessment times for all three formulations relative to the control. Following treatment with Karate 25CS, no feeding was recorded throughout the study. This compares to feeding levels for surviving spiders of up to 100% in the Karate 5EC and Karate	

5WG treatments. In conclusion, according to the IOBC Classification scheme (Hassan, 1992), *lambda*-Cyhalothrin may be regarded as Moderately Harmful (mortality 80%-99%, Category 3) to Lycosidae.	

	Evaluation by Competent Authorities
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	Not relevant
Materials and Methods	[redacted]
Results and discussion	
Conclusion	[redacted]
Reliability	
Acceptability	
Remarks	

98/8 Doc IIIA section No. 7.5.4.1/29	Acute toxicity to honey bees and other beneficial arthropods, for example predators
91/414 Annex Point addressed	Other arthropods

		Official use only
Reference point (location) in dossier	**7.5.4.1/29**	
Title:	PP321: Effects of autumn application to cereals on the beneficial arthropod fauna	
Project/Report number:	RJ0728B	
Author(s):	White, J.S., Everett, C. J. , Jackson, D. and Brown, R.A.	
Date of report:	1989	
Published:	Not published	
Testing facility:	Jealott's Hill Research Station, ICI Agrochemicals, Bracknell, UK	
Test substance:	*lambda*-Cyhalothrin, EC formulation 5.0%	
Study dates	Autumn 1986 – Summer 1988	
GLP:	Y	
Deficiencies:	None	
Reliability indicator	1	

	Official use only
Materials and methods: A field study to assess the effects of autumn application of *lambda*-Cyhalothrin, formulated as an emulsifiable concentrate nominally containing 50 ga.s./L, to cereals on beneficial arthropod fauna has been conducted. The test chemicals were applied to the winter wheat in early November 1986 and 1987, when the crop had reached Zadok growth stage 12 to 13. Based on the nominal sprayer output and the nominal formulation concentration, the spray tank dilutions were made up to give the recommended application rates of 5 g a.s./ha for *lambda*-Cyhalothrin and 400 g a.s./ha for dimethoate. A large scale autumn field trial such as this represents a "worst case" in terms of recovery time and magnitude of effect (due to low levels of activity and no breeding). **Findings:** Despite the stringent test conditions, *lambda*-Cyhalothrin (5 g a.s./ha) showed no chronic effects on beneficial arthropod populations or aphid populations in the summer following an autumn application. In autumn 1986, 90 predatory organism taxa were identified at the trial site. Eight of the 16 predatory species that were sufficiently abundant to be analysed statistically were depressed in abundance during the trial following an autumn application of *lambda*-Cyhalothrin to winter wheat at 5 g a.s./ha. In autumn 1987, 93 predatory species were identified at the trial site and 8 of the 17 abundant species were depressed in abundance. Mean depressions were typically	

20 to 60% and lasted 4 to 5 weeks. Following dimethoate applications at 400 g ai/ha in the autumn (1987), seven of the 17 abundant predatory species were depressed in abundance. Mean depressions were typically 50% and lasted 5 to 6 weeks. In general the duration of the effects on carabid beetles were greater with dimethoate than with *lambda*-Cyhalothrin, with the reverse being true for Linyphiidae. There was little difference in the duration of the effect of the two chemicals on staphylinids and generally the magnitude of any effect was similar after *lambda*-Cyhalothrin and dimethoate treatment. In both summers following treatment, observations of predator abundance, predatory capacity and aphid population development showed a lack of chronic effects of *lambda*-Cyhalothrin. **Predation index.** Following autumn spraying in the first year there was a slight fall (20% detransformed) in the percentage of pupae attacked by predators on the *lambda*-Cyhalothrin treated plots, compared to the controls. This reduced activity on the treated plots continued for 4 to 5 weeks before returning to the level of the control plots. In the second year, again following autumn application, the predation index showed a similar pattern to that in the first year. There was a slight fall (25% detransformed) in the total percentage of pupae attacked on the *lambda*-Cyhalothrin and dimethoate treated plots, which lasted 4 to 5 weeks. During the following summer, feeding activity was higher than before the autumn spray and comparable to that observed in the preceding summer. **Aphid population assessments.** These studies were with aphid populations developing in the summer following the sprays. In the first year (1987), there was no statistically significant difference between aphid numbers on control and treated plots at any time. There was no evidence for a difference between the rates of increase in aphid populations on the control and *lambda*-Cyhalothrin treated plots. In the second year (1988), aphid numbers on the control plots remained statistically significantly higher than those on *lambda*-Cyhalothrin treated plots for 28 days and higher than those on the dimethoate treated plots for the majority of the sampling period. Weighted exponential regression analysis showed no difference in the rate of increase during the rapid growth phase of aphid populations on treated and untreated plots.	

	Evaluation by Competent Authorities
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	Not relevant
Materials and Methods	[redacted]
Results and discussion	
Conclusion	[redacted]
Reliability	
Acceptability	
Remarks	

98/8 Doc IIIA section No.	7.5.4.1/30	Acute toxicity to honey bees and other beneficial arthropods, for example predators
91/414 Annex Point addressed		Other arthropods

		Official use only
Reference point (location) in dossier	**7.5.4.1/30**	
Title:	*Lambda*-Cyhalothrin : Effects of a summer application to cereals on the beneficial arthropod fauna	
Project/Report number:	RJ0956B	
Author(s):	McMullin, L.C., Everett, C.J., White, J.S. and Brown, R.A.	
Date of report:	1991	
Published:	Not published	
Testing facility:	Jealott's Hill Research Station, Zeneca Agrochemicals, Bracknell, UK	
Test substance:	*lambda*-Cyhalothrin, EC formulation 5.0%	
Study dates	Summer 1990	
GLP:	Yes	
Deficiencies:	None	
Reliability indicator	1	

	Official use only
Materials and methods: A further field test has been conducted to examine the effects on beneficial arthropod fauna of summer application to cereals of *lambda*-Cyhalothrin, formulated as an emulsifiable concentrate nominally containing 50 g a.s./L. *Lambda*-Cyhalothrin (7.5 g a.s./ha) and the positive control, Dimethoate 40 (336 g a.s./ha) were applied on 12 June 1990, when the crop had reached Zadok growth stage 65 to 69. However, due to one spray jet being faulty the actual application rates were 7.1 g a.s./ha for *lambda*-Cyhalothrin and 319 g a.s./ha for dimethoate. **Findings:** During the study, 96 predatory taxa were identified of which 41 were sufficiently abundant to be considered in detail. A summer application of *lambda*-Cyhalothrin to winter wheat at 7.1 g a.s./ha significantly depressed 62% of the predatory organism taxa analysed. The treatment effects lasted for an average of 27 (± 6) DAS, with a mean depression of 75% compared to the control populations. In comparison, an application of dimethoate at 319 g a.s./ha affected 79% of taxa for an average of 26 (± 3) DAS, with a mean depression of 77%. The relative selectivity of the chemicals were similar to that previously recorded, with the magnitude of the effect on Carabidae and Staphylinidae being greater with dimethoate than *lambda*-Cyhalothrin, with the reverse being true for Araneae. Of the game-bird food species identified, only *Heteroptera* spp. and the chrysomellids were sufficiently abundant to analyze statistically. The abundance of these species was significantly	

lower than the control for a maximum of 30 DAS following *lambda*-Cyhalothrin applications and 10 DAS following dimethoate applications. Analysis of spray deposition on *lambda*-Cyhalothrin plots showed a spray penetration to ground-level of between 42% and 67%; visual observations indicated that spray attenuation was dependent on crop density. This study shows that an application of *lambda*-Cyhalothrin at 7.1 g a.s./ha to winter wheat in June affected the abundance of a number of non-target arthropods, but that this effect was transient, typically lasting for 4 weeks after treatment. The recovery of non-target arthropod populations following treatment with *lambda*-Cyhalothrin has also been documented in a number of other studies and would appear not to adversely affect the arthropod fauna in the medium term. Therefore the data supports the use of *lambda*-Cyhalothrin as a summer applied insecticide. *Lambda*-Cyhalothrin gave excellent control of aphids (> 90 %) and there was no resurgence on control or treated plots.	

	Evaluation by Competent Authorities
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	Not relevant
Materials and Methods	[redacted]
Results and discussion	
Conclusion	[redacted]
Reliability	
Acceptability	
Remarks	

98/8 Doc IIIA section No. 7.5.4.1/31	Acute toxicity to honey bees and other beneficial arthropods, for example predators
91/414 Annex Point addressed	Other arthropods

		Official use only
Reference point (location) in dossier	**7.5.4.1/31**	
Title:	*Lambda*-Cyhalothrin: The effects of a summer application on the beneficial arthropod fauna in cereals using three different spray rates.	
Project/Report number:	RJ1250B	
Author(s):	McMullin, L.C., Everett, C.J., Canning, L. and Brown, R.A.	
Date of report:	1992	
Published:	Not published	
Testing facility:	Jealott's Hill Research Station, Zeneca Agrochemicals, Bracknell, UK	
Test substance:	*lambda*-Cyhalothrin, EC formulation 5.26%	
Study dates	April - August 1991	
GLP:	Yes	
Deficiencies:	None	
Reliability indicator	1	

	Official use only
Materials and methods: The effects of summer (June)-applied *lambda*-Cyhalothrin on beneficial arthropods in winter wheat was investigated in a large-scale field study in the UK. This study was briefly summarised in the 1995 M-II Section 6 submission but was incorrectly dated as *McMullin LC, Everett C J, Canning L & Brown R A (1991)* in the text and was not included in the reference list. A more extensive summary is provided here, with the report correctly referenced. The study was designed as a four replicate/five treatment randomised block with plots of at least 1 ha. *Lambda*-Cyhalothrin was applied at rates of 2.5, 5 and 10 g a.s./ha at early flowering (Zadoks' 65). A reference treatment (Dimethoate at 336 g a.s./ha) and an untreated control were included. Ground-active species were sampled by pitfall traps and crop-living species by sweep-netting. Numbers on the *lambda*-Cyhalothrin plots were compared with plots sprayed with dimethoate at 336 g a.s./ha and unsprayed controls, for seven weeks after application (until harvest). Aphid levels were assessed directly on the crop. **Findings:** In this trial 81 taxa were identified of which 42 were sufficiently abundant to be considered in detail. **Effects on non-target arthropods:** All direct treatment effects were transient, lasting a maximum of seven weeks after spraying, with no statistically significant effects remaining at	

the end of the trial. Effects on individual ground-active species were small. The majority were of short duration (up to 4 weeks after spraying). The greatest effects were seen on spider populations though these had recovered by the end of the study. Total numbers of staphylinid beetles were significantly depressed for 2 days after *lambda*-Cyhalothrin treatments at 5 g ai/ha, but no significant effects were recorded on the total population following applications of *lambda*-Cyhalothrin at 2.5 and 10 g ai/ha. Total numbers of Araneae on *lambda*-Cyhalothrin treated plots were shown to be significantly depressed for 34 days after spray at 2.5 g a.s./ha, and for 41 days at 5 and 10 g a.s./ha. Low aphid populations during this study resulted in low populations of foliar-dwelling aphid specific predators (e.g. Coccinellids and Syrphids) and no statistically significant treatment effects were detectable. Aphid parasitoid populations on all treatments had returned to control levels by 27 DAT. Numbers caught were up to around 40 per control plot at treatment time, but declined to low numbers by the end of the study, as aphid numbers declined. When the results were considered in terms of the magnitude of treatment effects, it was observed that the selectivity of *lambda*-Cyhalothrin applications increased at rates below 10 g a.s./ha. **Pest control:** *Lambda*-Cyhalothrin gave good aphid control with no evidence of resurgence during the study period. Throughout the study period, aphid numbers were well below economic threshold levels on all plots (including controls). Two aphid species were found: *Sitobion avenae* and *Metopolophium dirhodum*. After spraying similar levels of control were achieved after applications of *lambda*-Cyhalothrin at 2.5 and 5 g a.s./ha. Higher control was achieved at 10 g a.s./ha. No evidence of resurgence was observed in any plot.	

	Evaluation by Competent Authorities
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	Not relevant
Materials and Methods	[redacted]
Results and discussion	
Conclusion	[redacted]
Reliability	
Acceptability	
Remarks	

98/8 Doc IIIA section No.	7.5.4.1/32	Acute toxicity to honey bees and other beneficial arthropods, for example predators
91/414 Annex Point addressed		Other arthropods

		Official use only
Reference point (location) in dossier	**7.5.4.1/32**	
Title:	*Lambda*-Cyhalothrin : Effects of application in soybean on the principal target pests and their key natural enemies	
Project/Report number:	TMJ2969A	
Author(s):	White, J.S. and Brown, R.A.	
Date of report:	1992	
Published:	Not published	
Testing facility:	Zeneca	
Test substance:	*lambda*-Cyhalothrin, EC formulation 50 g/L	
Study dates	1990 - 1991	
GLP:	Not given	
Deficiencies:	None	
Reliability indicator	2	

	Official use only
Materials and methods: A field study was carried out in Brazilian soya, to investigate the direct and indirect effects of *lambda*-Cyhalothrin on the key soybean pests, the Velvetbean Caterpillar (*Anticarsia gemmatalis* (Lepidoptera: Noctuidae)) and the Green Stink Bug (*Nezara viridula* (Hemiptera: Pentatomidae)), and their natural enemies. The study was carried out in collaboration with the Federal University of Rio Grande do Sul and EMBRAPA-CNPSoja (Londrina) in the Passo Fundo Region. Single applications of *lambda*-Cyhalothrin as 'Karate 5EC' (50 g a.s./L EC) at 3.75 g a.s./ha were made to four replicate large plots (>1 ha). Comparisons were made with monocrotophos as 'Azodrin 400' (400 g a.s./L EC) applied at 120 g a.s./ha and an untreated control. The state of Rio Grande do Sul, where the trial was conducted, was seriously affected by a drought during 1990-1991, rainfall at the trial site being 65% that of a typical year. Consequently, the crop leaf area index and yield were approximately half that of a normal year and the crop canopy was not closed at spraying resulting in 56% deposition at ground level which is about ten fold higher than expected under a closed crop canopy. As a result there was an atypically high exposure of natural enemies and the trial can be reasonably considered "worst case" with respect to effects on natural enemies. Arthropod sampling was carried out weekly by crop beating (to sample crop dwelling arthropods) and by pitfall trapping (to sample for foliage dwelling arthropods). Parasitism and entomopathogen infection of the main pest species *A. gemmatalis* were also studied, by collecting the caterpillars in the field and rearing them in the laboratory to determine the percentage of parasitism or percentage of infection.	

Findings **Effects on non-target arthropods:** 42 predatory arthropod taxa were identified. Transient effects were observed on foliar-dwelling arthropods. Foliar predators (dominated by Hemipterans) were reduced in number for 3 weeks after spraying in the *lambda*-Cyhalothrin plots, approximately a week longer than in the monocrotophos plots, but they recovered quickly and by a week later, abundance's were greater than in the monocrotophos plots and significantly higher than the control. Predators living on the ground (72% were Formicidae) were unaffected by *lambda*-Cyhalothrin, but reductions of up to 30% were noted in the monocrotophos plots. There were no effects of *lambda*-Cyhalothrin on parasitoids or percentage parasitism of Lepidopteran larvae and there was no evidence that *lambda*-Cyhalothrin affected entomopathogen infectivity. **Pest control:** There was no re-infestation of target pests or outbreaks of new pest species. *A. gemmatalis* was abundant at the trial site, but *N. viridula* was not. Due to the combination of high *A. gemmatalis* density and poor crop development, insecticide treatments were made below the economic damage threshold density. Both *lambda*-Cyhalothrin and monocrotophos gave over 90% control of the pest for 14 days after treatment. Higher leaf area indices were observed on both treatment plots (*lambda*-Cyhalothrin and monocrotophos) with a statistically significant yield advantage on the *lambda*-Cyhalothrin plots, suggesting that insecticide applications were necessary given the pest density relative to the crop development.	

	Evaluation by Competent Authorities
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	Not relevant
Materials and Methods	[redacted]
Results and discussion	
Conclusion	[redacted]
Reliability	
Acceptability	
Remarks	

98/8 Doc IIIA section No.	7.5.4.1/33	Acute toxicity to honey bees and other beneficial arthropods, for example predators
91/414 Annex Point addressed		Other arthropods

		Official use only
Reference point (location) in dossier	**7.5.4.1/33**	
Title:	*Lambda*-Cyhalothrin : A study of the effects on natural enemies of rice insect pests in the Philippines	
Project/Report number:	TMJ3453B	
Author(s):	Pilling, E.D.	
Date of report:	1995	
Published:	Not published	
Testing facility:	Field site, Luzon, Phillipines	
Test substance:	*lambda*-Cyhalothrin, EC formulation 2.5%	
Study dates	The "wet season" in 1994	
GLP:	No	
Deficiencies:	None	
Reliability indicator	2	

	Official use only
Materials and methods: In Central Luzon, Philippines, a large-scale field study was carried out in collaboration with the Philippines Rice Research Institute (PhilRice), to determine the effect of *lambda*-Cyhalothrin on pest and natural enemy populations in rice. The trial was conducted on a 2.5 ha rice paddy farm near Cabantuan City in Nueva Ecija, Luzon, Philippines. Twenty paddies of approximately equal size (>1000 m^2) were separated into 4 blocks of 5 plots. Different spray regimes of *lambda*-Cyhalothrin formulated as 'Karate' 2.5EC (25 g a.s./L EC) were applied using a knapsack sprayer, and compared to the reference compound monocrotophos (formulated as 'Azodrin 202R 30EC'). The treatment regimes were: a) Unsprayed control; b) *Lambda*-Cyhalothrin, low input (6.25 g a.s./ha applied twice, 43 and 70 days after transplanting (DAT)); c) *Lambda*-Cyhalothrin, medium input (6.25 g a.s./ha applied three times, 21, 43 and 70 DAT); d) *Lambda*-Cyhalothrin, high input (three applications: 6.25 g a.s./ha applied 21 DAT, 9.0 g a.s./ha applied 43 DAT and 12.5 g a.s./ha applied 70 DAT); e) Toxic reference (Monocrotophos at 400 g a.s./ha on 21, 43 and 70 DAT). Arthropod populations were monitored throughout the wet cropping season using suction and sweep-net sampling techniques. Stem Borer (Lepidoptera, *Scircophaga incertulas* and *Chilo suppressalis*) egg parasitoid populations were assessed by counting the percentage emergence from field exposed eggs. Pest damage was estimated by visual counting. Estimations of final	

rice yield were made to determine if any impact of treatments on predators and pests resurgence translated into yield reductions. **Findings** **Effects on non-target arthropods:** Over 50 different species of natural enemies were identified from four main groups: spiders (Araneae), damselflies (Odonata: Zygoptera), ladybirds (Coleoptera: Coccinellidae) and parasitoid wasps (Hymenoptera). The pattern of effects was very similar in all *lambda*-Cyhalothrin input regimes. In general, applications of *lambda*-Cyhalothrin reduced the numbers of total natural enemy populations immediately after treatment, but population densities started recovering between 7 and 14 days post-treatment and were estimated to completely recover to control levels after 28 days. Damselflies (Zygoptera) and parasitoid wasps (Hymenoptera), being relatively mobile, rapidly reinvaded after *lambda*-Cyhalothrin applications. Higher magnitude and duration of effects were observed with spiders (Araneae) and ladybirds (Coccinellidae). **Pest control:** The Green Leafhopper (Homoptera, *Nephotettix* sp.) was substantially controlled, as was the Whorl Maggot (Diptera, *Hydrellia* sp.), Green Semilooper (Lepidoptera, *Naranga aenescens*), Leaf Beetle (Coleoptera, *Oulema oryzae*), Leaffolder (Lepidoptera, *Cnaphalocrosis medinalis*) and Rice Bug (Hemiptera, *Scotinophara* sp.). No resurgence problems were evident with any of the pests. Throughout the season *lambda*-Cyhalothrin had little effect on the relative proportions of predators and pests within the plots, and the pest:predator ratio even increased above the control later in the season. This suggested that the beneficial capacity within the plots was unaffected. Treatments of *lambda*-Cyhalothrin, following the medium and high input regimes significantly increased yield production above the control.	

	Evaluation by Competent Authorities
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	Not relevant
Materials and Methods	[redacted]
Results and discussion	
Conclusion	[redacted]
Reliability	
Acceptability	
Remarks	

98/8 Doc IIIA section No.	7.5.4.1/34	Acute toxicity to honey bees and other beneficial arthropods, for example predators
91/414 Annex Point addressed		Other arthropods

		Official use only
Reference point (location) in dossier	**7.5.4.1/34**	
Title:	*Lambda*-Cyhalothrin: The effects on beneficial and pest arthropods in *Bt*-cotton	
Project/Report number:	TMJ3951B	
Author(s):	Cole, J.F.H.	
Date of report:	2001	
Published:	Not published	
Testing facility:	Field site in Berrien County, near Nashville, Georgia.	
Test substance:	*lambda*-Cyhalothrin, EC (1E) formulation 125 g/L *lambda*-Cyhalothrin, CS (25CS) formulation 250 g/L	
Study dates	Week 23 – 35, 1996	
GLP:	No	
Deficiencies:	None	
Reliability indicator	2	

	Official use only
Materials and methods: To investigate the effects of over-spray applications of *lambda*-Cyhalothrin on the natural-enemies of cotton pests in varieties incorporating the endotoxin *Bacillus thuringiensis* (*Bt*), a study was carried out in Georgia, USA in collaboration with the University of Georgia. The study was designed as a four replicate/five treatment randomised block. The minimum plot size was approximately 3.4 acre (1.4 ha), with an average size of approximately 5.2 Ac (2.1 ha). The treatments were as follows: a) Control: Unsprayed check; b) *Lambda*-Cyhalothrin as "KARATE" 1E (10 g a.s./L EC) at 0.015 lbs a.s.i/Ac (17 g a.s./ha); c) *Lambda*-Cyhalothrin as "KARATE" 1E (10 g a.s./L EC) at 0.025 lbs a.s./Ac (28 g a.s./ha); d) *Lambda*-Cyhalothrin as "KARATE" 25CS (250 g a.s./L CS) at 0.025 lbs a.s./Ac (28 g a.s./ha); e) Methyl-parathion as "4lb Methyl-Parathion" EC (reference chemical) at 0.5 lbs a.s./Ac (560 g a.s./ha). Spraying was carried out by ground application using a row sprayer. Two applications of each insecticide treatment were made during the season, at 5 and 10 weeks after planting (WAP). The crop cover was assessed at each spray date in order to estimate the relative potential for exposure of ground-living organisms to direct chemical spray. Throughout the study, arthropod	

sampling was carried out weekly using the following methods:

a) Sweep-netting - net passes through the foliage;
b) Shake-cloth - agitation of the crop and collection into containers or onto cloths;
c) Whole-plant - visual investigation of individual plants to monitor crop development and pest population trends;
d) Pitfall trapping - cups set in the ground level with soil surface.

Levels of lepidopteran parasitism were also assessed by collecting bollworm/budworm (Heliothine) eggs and moth larvae (Lepidoptera) and observing them for a period of time to detect parasitoids.

Findings

Effects on non-target arthropods: Over 30 species of beneficial arthropod were identified. The majority in the crop foliage (nearly 50%) were predatory hemipterans of the genus *Geocoris* and *Orius*, while another 12% consisted of Araneae. On the ground, over 50% were Formicidae (*Solenopsis* sp.) with the remainder including mainly Carabidae, Araneae and Dermaptera. The most abundant groups all showed some transient numerical reduction in all the insecticide treatments. Other groups, including lady beetles, hooded beetles, lacewings, ground beetles and parasitoid wasps revealed no consistent population reductions from the sprays. In general, foliage dwelling beneficial species were low in abundance at the start of the study when the crop was small, therefore the first insecticide sprays had little ecological effect. The second application, however, gave rise to transient suppressions of natural enemy numbers which recovered generally within 10 days. The *lambda*-Cyhalothrin EC low rate had no significant effect at this time (P = 0.05), whereas the remaining insecticide treatments, made at normal US use rates, all resulted in significantly suppressed numbers by 2-3 days after spraying. The total numbers of beneficial species caught in pitfall traps were generally similar in all treatments for the duration of the study, including the control. There was a reduction in the catch of around 50% on all the chemical treatments 5 WAP, during the week of the first applications, but numbers fell generally at this time and significant differences from the control were shown only on the high rate *lambda*-Cyhalothrin EC and methyl-parathion treatments. The sweep-net samples collected 10 days after the second sprays and onwards revealed no further significant effects with any treatment. However, a significant reduction of numbers was evident in shake-cloth samples in the *lambda*-Cyhalothrin CS treatment at two weeks and in the methyl-parathion plots at four weeks after application, indicating that recovery from sprays was perhaps less rapid within the foliage.

Pest control: There was effective control by all applications of pest species not controlled by the *Bt* endotoxin, with significant yield increases on the *lambda*-Cyhalothrin plots (not evident with methyl-parathion).

Direct comparisons of natural enemy and pest population numbers revealed that *lambda*-Cyhalothrin did not cause significant disruption of season-long predator to pest ratios. This indicates that even during the transient decrease in beneficial arthropod populations observed after *lambda*-Cyhalothrin applications, the balance between predators and pests will be maintained having therefore a minimal ecological impact. Yield increases between 10-20% were achieved in the *lambda*-Cyhalothrin treatments, whereas the use of methyl-parathion resulted in a 1% increment in yield which was not significantly different from the control.

	Evaluation by Competent Authorities
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	Not relevant
Materials and Methods	[redacted]

	[redacted]
Results and discussion	
Conclusion	[redacted]
Reliability	
Acceptability	
Remarks	

98/8 Doc IIIA section No. 7.5.4.1/35	Acute toxicity to honey bees and other beneficial arthropods, for example predators
91/414 Annex Point addressed	Other arthropods

		Official use only
Reference point (location) in dossier	**7.5.4.1/35**	
Title:	*Lambda*-Cyhalothrin: investigation into the toxicity of a 5% emulsifiable concentrate to predatory lycosid spiders (Lycosidae, Araneae) and the carabid beetle *Pterostichus melenarius*	
Project/Report number:	TMJ3357B	
Author(s):	Farrelly, L.C.	
Date of report:	1994	
Published:	Not published	
Testing facility:	Jealott's Hill Research Station, Zeneca Agrochemicals, Bracknell, UK	
Test substance:	*lambda*-Cyhalothrin, EC formulation 5.52%	
Study dates	May – August 1989	
GLP:	Yes	
Deficiencies:	None	
Reliability indicator	1	

	Official use only
Materials and methods: 50 g/L EC formulation (JF9509), *lambda*-Cyhalothrin content of 5.52% w/w. The effects of *lambda*-Cyhalothrin applied at 7.5 g a.s./ha to natural sandy soil on two beneficial, polyphagous predators, the carabid beetle *Pterostichus melenarius* and *Pardosa* spp. lycosid spiders. The beetles and spiders were sprayed directly and in addition exposed to spray deposit on the soil for up to 6 days. Dimethoate at 350 g a.s./ha was applied as a positive control. **Findings:** Following treatment with *lambda*-Cyhalothrin at 7.5 g a.s./ha, there was 20% mortality of *P. melenarius* after 6 days. There were no control mortalities. Mortality in the *lambda*-Cyhalothrin treatment was not significantly different from the control at the 5% probability level. Feeding activity was only significantly reduced for two days after treatment. Following treatment with *lambda*-Cyhalothrin at 7.5 g a.s./ha, there was 90% mortality of *Pardosa* spp. after 6 days. There were no control mortalities. Mortality in the *lambda*-Cyhalothrin treatment was significantly different from the control at the 5% probability level. No feeding activity was recorded in any of the *lambda*-Cyhalothrin treatment replicates throughout the study.	

Dimethoate at 350 g a.s./ha resulted in 80% and 27% mortality for *P. melenarius* and *Pardosa* spp., respectively. The mortality due to dimethoate was significantly different from controls from one day after treatment until the end of the study. *Lambda*-Cyhalothrin as a 50 g/l EC formulation at 7.5 g a.s./ha resulted in 20% mortality of *P. melenarius* and is classified as 'Harmless' to this species under the IOBC classification scheme. *Lambda*-Cyhalothrin at 7.5 g a.s./ha resulted in 90% mortality of *Pardosa* spp. and is classified as 'Moderately Harmful' to this species under the IOBC classification scheme.	

	Evaluation by Competent Authorities
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	Not relevant
Materials and Methods	[redacted]
Results and discussion	
Conclusion	[redacted]
Reliability	
Acceptability	
Remarks	

98/8 Doc IIIA section No. 7.5.4.1/36	Acute toxicity to honey bees and other beneficial arthropods, for example predators
91/414 Annex Point addressed	Other arthropods

		Official use only
Reference point (location) in dossier	**7.5.4.1/36**	
Title:	Assessment of side effects (initial toxicity) of Karate 5EC on the larvae of the hoverfly *Episyrphus balteatus* Deg. (Diptera, Syrphidae) under semi-field conditions.	
Project/Report number:	93074/01-EbHF	
Author(s):	Tornier, I.	
Date of report:	1994	
Published:	Not published	
Testing facility:	GAB Biotechnologie GmbH, Niefern-Öschelbronn, Germany	
Test substance:	*lambda*-Cyhalothrin, EC formulation 5.35%	
Study dates	24 August – 28 September 1993	
GLP:	Yes	
Deficiencies:	None	
Reliability indicator	1	

	Official use only
Materials and methods: 50 g/L EC formulation, *lambda*-Cyhalothrin content of 5.35% w/w. Formulated *lambda*-Cyhalothrin was applied at a nominal rate of 10 g a.s./ha to broad beans *(Vicia faba)* sown in trays and infested with aphids. Larvae of *Episyrphus balteatus* were put on the broad beans before application of the spray solution. After application, the test system was moved to within cages under semi-field conditions. Triazophos formulated as Hostathion was applied at 0.6 L product/ha as a positive control. Larval mortality and reproduction rate of surviving adults were assessed. **Findings:** Pre-imaginal mortality in the *lambda*-Cyhalothrin treatment, adjusted for control mortality, was 76.0%. Pre-imaginal mortality in the Hostathion treatment, adjusted for control mortality, was 100%. The egg production of surviving females in the *lambda*-Cyhalothrin treatment was 100.0 eggs per female, compared to 80.1 eggs per female in the control. Eggs laid by females in the *lambda*-Cyhalothrin treatment did not hatch; compared to a hatch rate of 27.6% in the control. However, fecundity among individual females, in terms of both egg numbers and egg viability, are known to be highly variable; and results from the *lambda*-Cyhalothrin treatment are based on only 7 surviving females, compared with 28 in the controls.	

Lambda-Cyhalothrin as a 50 g/l EC at 10 g a.s./ha under semi-field conditions resulted in 76% mortality of *E. balteatus*. There were inconclusive differences in fecundity between treated and control test organisms.	

	Evaluation by Competent Authorities
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	Not relevant
Materials and Methods	[redacted]
Results and discussion	
Conclusion	[redacted]
Reliability	
Acceptability	
Remarks	

98/8 Doc IIIA section No. 7.5.4.1/37	Acute toxicity to honey bees and other beneficial arthropods, for example predators
91/414 Annex Point addressed	Other arthropods

		Official use only
Reference point (location) in dossier	**7.5.4.1/37**	
Title:	Assessment of side effects (initial toxicity) of Karate WG on the larvae of the hoverfly *Episyrphus balteatus* Deg. (Diptera, Syrphidae) under semi-field conditions	
Project/Report number:	93041/01-EbHF	
Author(s):	Tornier, I.	
Date of report:	1994	
Published:	Not published	
Testing facility:	GAB Biotechnologie GmbH, Niefern-Öschelbronn, Germany	
Test substance:	*lambda*-Cyhalothrin, EC formulation 5.0%	
Study dates	24 August – 28 September 1993	
GLP:	Yes	
Deficiencies:	No	
Reliability indicator	1	

	Official use only
Materials and methods: 50 g/kg WG formulation (YF8048), *lambda*-Cyhalothrin content of 5.0% w/w. Formulated *lambda*-Cyhalothrin was applied at a nominal rate of 7.5 g a.s./ha to broad beans *(Vicia faba)* sown in trays and infested with aphids. Larvae of *Episyrphus balteatus* were put on the broad beans before application of the spray solution. After application, the test system was moved to within cages under semi-field conditions. Triazophos formulated as Hostathion was applied at 0.6 L product/ha as a positive control. Larval mortality and reproduction rate of surviving adults were assessed. **Findings:** Pre-imaginal mortality in the *lambda*-Cyhalothrin treatment, adjusted for control mortality, was 70.4%. Pre-imaginal mortality in the Hostathion treatment, adjusted for control mortality, was 100%. The egg production of surviving females in the *lambda*-Cyhalothrin treatment was 16.3 eggs per female, compared to 80.1 eggs per female in the control. Eggs laid by females in the *lambda*-Cyhalothrin treatment did not hatch; compared to a hatch rate of 27.6% in the control. However, fecundity among individual females, in terms of both egg numbers and egg viability, are known to be highly variable; and results from the *lambda*-Cyhalothrin treatment are based on only 8 surviving females, compared with 28 in the controls.	

Lambda-Cyhalothrin as a 50 g/kg WG formulation at 7.5 g a.s./ha under semi-field conditions resulted in 70.4% mortality of *E. balteatus*. There were inconclusive differences in fecundity between treated and control test organisms.	

	Evaluation by Competent Authorities
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	Not relevant
Materials and Methods	[redacted]
Results and discussion	
Conclusion	[redacted]
Reliability	
Acceptability	
Remarks	

98/8 Doc IIIA section No.	7.5.4.1/ 38	Acute toxicity to honey bees and other beneficial arthropods, for example predators
91/414 Annex Point addressed		Other arthropods

		Official use only
Reference point (location) in dossier	**7.5.4.1/38**	
Title:	A comparison between the effects of the CS and EC formulations of *lambda*-Cyhalothrin on selected beneficial insects	
Project/Report number:	TMJ3685B	
Author(s):	Kedwards, H., Coulson, J.M., Fleming, T.M. and Lavendar, K.H.	
Date of report:	2000	
Published:	Not published	
Testing facility:	Jealott's Hill Research Station, Zeneca Agrochemicals, Bracknell, UK	
Study dates	Not stated in the report	
GLP:	No	
Deficiencies:	None	
Reliability indicator	2	

	Official use only
Materials and methods: *Lambda*-Cyhalothrin 25 g/L CS (WF2471), purity not stated; and *lambda*-Cyhalothrin 5 g/L EC (YF7879), purity not stated. The two formulations were applied to leaf surfaces (unspecified type) using a track sprayer. All treatments were applied in a volume of 200 L/ha. Test organisms were exposed to both formulations, for comparison, and by either residual route only or by contact plus residual routes. The test species were *Episyrphus balteatus* larvae, *Chrysoperla carnea* larvae and *Coccinella septempunctata* adults. Ten organisms were tested at each treatment concentration. **Findings** Results are presented in the table below. There were no significant differences (at P = 0.05) in toxicity between the CS and EC formulations for any of the three test species tested by either residual only or contact plus residual exposure. There is no difference in the intrinsic toxicity of *lambda*-Cyhalothrin as a 250 g/L CS or a 50 g/L EC formulation to *C. septempunctata*, *E. balteatus* and *C. carnea*.	

Effects on three non-target arthropod species following exposure to sprayed residues of CS and EC *lambda*-Cyhalothrin formulations on leaf surfaces

Species (life stage)	Formulation and exposure route	LC_{50} (mg a.s./L)	95% confidence intervals	equivalent LR_{50} (g a.s./ha)
Episyrphus balteatus (larvae)	EC, residual	31.90	16.31 - 59.67	6.38
	EC, contact plus residual	12.14	5.54 - 24.02	2.43
	CS, residual	27.39	13.30 - 52.82	5.48
	CS, contact plus residual	27.95	13.47 - 54.37	5.59
Chrysoperla carnea (larvae)	EC, residual	51.94	22.54 - 121.73	10.39
	EC, contact plus residual	56.13	24.24 - 136.06	11.23
	CS, residual	90.45	40.31 - 230.42	18.09
	CS, contact plus residual	40.14	17.44 - 91.71	8.03
Coccinella septempunctata (adults)	EC, residual	1.726	0.916 - 3.103	0.35
	EC, contact plus residual	0.871	0.479 - 1.566	0.17
	CS, residual	0.788	0.427 - 1.406	0.16
	CS, contact plus residual	1.058	0.592 - 1.827	0.21

Evaluation by Competent Authorities	
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	Not relevant
Materials and Methods	[redacted]
Results and discussion	
Conclusion	[redacted]
Reliability	[redacted]
Acceptability	[redacted]
Remarks	

98/8 Doc IIIA section No.	7.5.5	Bioconcentration, terrestrial

An estimation of the potential BCF for earthworms is provided below. The BCF was calculated in accordance with Draft Guidance Document on Risk Assessment for Birds and Mammals Under Council Directive 91/414/EEC (SANCO/4145/2000, 25th September 2002). As follows: $BCF = (C_{worm}/C_{soil}) = (0.84 + 0.01\,K_{ow}) / f_{oc}\,K_{oc}$ Where: K_{oc} = Organic carbon adsorption coefficient f_{oc} = Organic carbon content of soil (0.02 is used as a default value) For lambda-cyhalothrin the K_{ow} (estimated from the Log P_{ow} of 7.0 at 20 °C) = 10000000. The mean K_{oc} is 157000. The resultant earthworm BCF is 31.85, showing a low potential for bioaccumulation.	Official use only

EVALUATION BY RAPPORTEUR MEMBER STATE	
Date	Not relevant
Evaluation of applicant's justification	[redacted]
Conclusion	[redacted]
Remarks	

98/8 Doc IIIA section No.	7.5.5.1	Bioconcentration, further studies

	JUSTIFICATION FOR NON-SUBMISSION OF DATA	Official use only
Other existing data [×] Limited exposure [ ]	Technically not feasible [ ] Scientifically unjustified [×] Other justification [ ]	
Detailed justification:	[redacted]	
Undertaking of intended data submission [ ]		
	Evaluation by Competent Authorities	
	EVALUATION BY RAPPORTEUR MEMBER STATE	
Date	Not relevant	
Evaluation of applicant's justification	[redacted]	
Conclusion	[redacted]	
Remarks		

98/8 Doc IIIA section No.	7.5.6	Effects on other terrestrial non-target organisms

	JUSTIFICATION FOR NON-SUBMISSION OF DATA	Official use only
Other existing data [ ] Limited exposure [ ]	Technically not feasible [ ] Scientifically unjustified [×] Other justification [ ]	
Detailed justification:	[redacted]	
Undertaking of intended data submission [ ]		
	Evaluation by Competent Authorities	
	EVALUATION BY RAPPORTEUR MEMBER STATE	
Date	Not relevant	
Evaluation of applicant's justification	[redacted]	
Conclusion	[redacted]	
Remarks		

98/8 Doc IIIA section No.	7.5.7	Effects on mammals *(headline)*

98/8 Doc IIIA section No.	7.5.7.1	For some product types, direct and/or indirect exposure for mammals is possible and some tests with mammals may be required in rare cases on the basis of concern for severe risk for the terrestrial environment *(headline)*

98/8 Doc IIIA section No.	7.5.7.1.1	Acute oral toxicity

JUSTIFICATION FOR NON-SUBMISSION OF DATA		Official use only
Other existing data [×] Limited exposure [ ]	Technically not feasible [ ] Scientifically unjustified [×] Other justification [ ]	
Detailed justification:	[redacted]	
Undertaking of intended data submission [ ]		
	Evaluation by Competent Authorities	
	EVALUATION BY RAPPORTEUR MEMBER STATE	
Date	Not relevant	
Evaluation of applicant's justification	[redacted]	
Conclusion	[redacted]	
Remarks		

98/8 Doc IIIA section No.	7.5.7.1.2	Short-term toxicity

JUSTIFICATION FOR NON-SUBMISSION OF DATA	Official

		use only
Other existing data [×] **Limited exposure [ ]**	**Technically not feasible [ ] Scientifically unjustified [×]** **Other justification [ ]**	
Detailed justification:	[redacted]	
Undertaking of intended data submission [ ]		
	Evaluation by Competent Authorities	
Date **Evaluation of applicant's justification** **Conclusion** **Remarks**	**EVALUATION BY RAPPORTEUR MEMBER STATE** Not relevant [redacted] [redacted]	

98/8 Doc IIIA section No.	7.5.7.1.3 Effects on reproduction

	JUSTIFICATION FOR NON-SUBMISSION OF DATA	Official use only
Other existing data [×] Limited exposure [ ]	Technically not feasible [ ] Scientifically unjustified [×] Other justification [ ]	
Detailed justification:	[redacted]	
Undertaking of intended data submission [ ]		
	Evaluation by Competent Authorities	
	EVALUATION BY RAPPORTEUR MEMBER STATE	
Date	Not relevant	
Evaluation of applicant's justification	[redacted]	
Conclusion	[redacted]	
Remarks		

Competent Authority Report

According to Directive 98/8/EC

lambda-Cyhalothrin

CAS 91465-08-6

Active substance in Biocidal Products, Product Type 18 (Insecticide)

Notifier: Syngenta European Center

DOCUMENT III-A

Section 8: Measures necessary to protect man, animals and the environment

Rapporteur Member State: Sweden

Final CAR, September 2008

Borttaget: Draft

KEMI
Kemikalieinspektionen
Swedish Chemicals Agency

Section A8 Measures necessary to protect man, animals and the environment

Official use only

Subsection (Annex Point)		See MSDS
8.1		**Recommended methods and precautions concerning handling, use, storage, transport or fire (IIA8.1)**
8.1.0	**Methods and precautions concerning placing on the market**	Products will be applied by Professionals, farmers etc and not sold to general public
8.1.1	**Methods and precautions concerning production, handling and use of the active substance and its formulations**	General: Avoid contact with skin, eyes and clothing. Avoid inhalation of dust. Exposed operating positions must have an efficient local exhaust source, working areas must be well ventilated. Do not eat, drink or smoke while working. In addition to the measures usually taken in chemical works like dustproof filling and measuring equipment (including dust extraction), further personal protection measures may have to be implemented to avoid possible contact with the product.
8.1.2	**Methods and precautions concerning storage of the active substance and its formulations**	Store the product in closed original containers. Protect from light and humidity. Store separately from feed, food and stimulants.
8.1.3	**Methods and precautions concerning transport of the active substance and its formulations**	Use unbreakable containers, make sure they cannot fall, and label in accordance with regulations.

Road transport ADR/RID

UN No.	: UN3352
Class-primary	: 6.1 Toxic Substance
UN Pack. Group	: III
Proper shipping name	: 3352 PYRETHROID PESTICIDE, LIQUID, TOXIC, LAMBDA-CYHALOTHRIN

Maritime transport IMDG

UN No.	: UN3352
Class-primary	: 6.1 Toxic Substance
UN Pack. Group	: III
Proper shipping name	: PYRETHROID PESTICIDE, LIQUID, TOXIC (contains lambda-cyhalothrin 81-91%)
Marine pollutant	: Yes