Doc IIIA / Section 8 — Measures necessary to protect man, animals and the environment

BPD Data Set IIA / Annex Point VIII.8.

		Official use only
Reference	Bayer safety data sheet 102000008859 Revision date 18 November 2005	
8.1 Recommended methods and precautions concerning handling, use, storage, transport or fire (Annex IIA, point 8.1)	**Handling and Use** Use only in area provided with appropriate exhaust ventilation **Personal protective equipment** Respiratory protection: If product is handled while not enclosed, and if skin contact may occur: Full mask Multi-range filter ABEK/P3 Hand protection: solvent-resistant gloves Hygiene measures: Avoid contact with skin, eyes and clothing. Keep working clothes separately. Wash hands immediately after work, if necessary take a shower Remove soiled or soaked clothing immediately and clean thoroughly before using again. Garments that cannot be cleaned must be destroyed (burnt). Protective measures: If product is handled while not enclosed, and if skin contact may occur: complete suit protecting against chemicals **Storage** Requirements for storage areas and containers: Keep container tightly closed. Store in a place accessible by authorized persons only. Keep only in the original container at temperature not exceeding 50 °C. German storage class / 6.1AL Combustible liquids, toxic Suitable materials : only use containers that are approved specifically for the substance/ product **Transport** ADR/RID/ADNR UN-No. 3352 Labels 6.1 Packaging group II Hazard no. 60 Description of the goods UN 3352 PYRETHROID PESTICIDE, LIQUID, TOXIC (CYFLUTHRIN SOLUTION) IMDG UN-No. 3352	

Class	6.1
Packaging group	II
Marine pollutant	Marine pollutant
Description of the goods	PYRETHROID PESTICIDE, LIQUID, TOXIC (CYFLUTHRIN SOLUTION)

IATA

UN-No.	3352
Class	6.1
Packaging group	II
Description of the goods	PYRETHROID PESTICIDE, LIQUID, TOXIC (CYFLUTHRIN SOLUTION)

Declaration for land shipment: CYFLUTHRIN (ZAEHFLUESSIG)

Declaration for sea shipment: Pesticides, liquid, toxic, n.o.s. CYFLUTHRIN (VISCOUS)

Declaration for shipment by air: Pesticide, liquid, toxic, n.o.s.(CYFLUTHRIN)

Fire

Extinguishing media: sprayed water jet, foam, carbon dioxide (CO_2), sand.

The spread of the fire-fighting media is to be contained and do not allow run-off from fire fighting to enter drains or water courses.

Special protective equipement for fire-fighter: In the event of fire and /or explosion donot breath fumes. Use breathing apparatus

8.2 In case of fire, nature of reaction products, combustion gases, etc. (Annex IIA, point 8.2)

Combustion gases: In the event of fire, the formation of hydrogen chloride, hydrogen cyanide, hydrogen fluoride, carbon monoxide and nitrogen oxides must be anticipated.

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8.3 Emergency measures in case of an accident (Annex IIA, point 8.3)

First Aid

General Information: Remove patients from the danger zone. If there is a risk of unconsciousness, position and transport in stable sideways position. Remove contaminated, soaked clothing immediately and dispose of safely. Also heed the risks to your own person

Skin contact: Take off all contaminated clothing immediately. Wash off with soap and water. After skin contact: Apply Vitamin E cream or simple toilet milks. Call a physician immediately.

Eye contact: Rinse eyes thoroughly with plenty of water for at least 15 minutes. Consult a physician immediately.

Inhalation: Transfer immediately to fresh air. Keep patient warm and at rest Give oxygen in cases of respiratory difficulties. Seek medical advice immediately.

Ingestion: Wash out mouth with water. Induce vomiting only, if: 1. patient is fully conscious, 2. medical aid is not readily available, 3. a significant amount (more than a mouthful) has been ingested and 4. time since ingestion is less than 1 hour. (Vomit should not get into the respiratory tract). Call in a physician immediately and show him the Safety Data Sheet.

Information for the physician:

This product/preparation contains a pyrethroid. Must NOT be confused with organophosphorus compounds.

Symptoms:

Local: After skin contact: paresthesia (local), usually transient with resolution within 24 hours.

Systemic: excitement, gastrointestinal discomfort, tremor, dizziness, headache, listlessness, nausea and vomiting, epigastric pain, muscular fasciculation of limbs, unconsciousness, convulsions and coma (very high doses).

Treatment:

Systemic treatment: Endotracheal intubation followed by gastric lavage and administration of charcoal. Monitoring of respiratory, cardiac and central nervous system. ECG (Electrocardiogram) monitoring. Early dialysis (haemoperfusion).

Check for pulmonary oedema in event of inhalation.

Against convulsions: Give diazepam: for adults 5 – 10 mg intravenously as necessary until fully sedated; for children 2.5 mg iv.

There is no antidote.

Contraindications: atropine, derivatives of adrenaline.

Environmental:

Accidental release measures: Do not discharge into the drains/surface water/groundwater.

Methods for cleaning up: Take up with absorbent material (e.g. sand, earth or a proprietary absorbent material). Clean contaminated floors and objects thoroughly, observing environmental regulations. Pack spilled material in suitable containers for recovery or disposal.

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8.4	**Possibility of destruction or decontamination following release in or on the following: (a) air (b) water, including drinking water (c) soil (Annex IIA, point 8.4)**	Dispose of by incineration in an authorised special waste incineration plant. Comply with local legislation. For larger quantities contact manufacturer. Waste key for the unused product : 020108 agrochemical waste containing dangerous substances. For decontamination measures following accidental release, each of the environmental compartments are considered as follows: a) Air: Significant contamination of air is unlikely to occur under conditions of normal use. b) Water: Significant contamination of water is unlikely to occur under conditions of normal use. c) Soil: Significant contamination of soil is unlikely to occur under conditions of normal use.
8.5	**Procedures for waste management of the active substance for industry or professional users**	Dispose of by incineration in an authorised special waste incineration plant. Comply with local legislation. For larger quantities contact manufacturer. Waste key for the unused product : 020108 agrochemical waste containing dangerous substances
8.5.1	**Possibility of re-use or recycling (Annex IIA, point 8.5.1)**	Re-use and recycling are not recommended. The product should only be used for the intended purpose.
8.5.2	**Possibility of neutralisation of effects (Annex IIA, point 8.5.2)**	There is no known possibility of neutralization. Incineration is the recommended method of disposal.
8.5.3	**Conditions for controlled discharge including leachate qualities on disposal (Annex IIA, point 8.5.3)**	Not applicable. Discharge is not permitted.
8.5.4	**Conditions for controlled incineration (Annex IIA, point 8.5.4)**	Any disposal must comply with Local and National Requirements which are derived from the EU Directives 94/67/EC of 16 December 1994 on the incineration of hazardous waste and 2000/76/EC of 4 December 2000 on the incineration of hazardous waste. As the halogen content in cyfluthrin is higher than 1%, the recommended temperature for pyrolysis is 1100 °C with residence time higher than 2 seconds and an oxygen excess higher than 6%. **Stability and reactivity** Thermal decomposition: at 250 °C or higher (DSC, heating rate 3 °C/min in glass). Specific consideration of halogens is not needed (content not critical: <

		60 % w/w halogens).
8.6	**Observations on undesirable or unintended side-effects, e.g. on beneficial and other non-target organisms (Annex IIA, point 8.6)**	Refer to Doc IIIA5.
8.7	**Identification of any substances falling within the scope of List I or List II of the Annex to Directive 80/68/EEC on the protection of ground water against pollution caused by certain dangerous substances**	Cyfluthrin does not come under any of the categories in list I and hence is considered to be included in list II (as a biocide).

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Evaluation by Competent Authorities	
	Use separate "evaluation boxes" to provide transparency as to the comments and views submitted
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	2006/11/30- Human health / professionals
Materials and methods	Recommendations about protective measures are given on the basis of expert judgement. Any results of studies about e.g. the necessary effectiveness of general or local exhaustive ventilation or PPE are not reported by the participant.
Conclusion	1 Handling and Use: Technical specification about the term "appropriate exhaust ventilation" is necessary. 2 Exposure Controls / Personal Protection: The PPE has to be described more detailed, e.g. the material, thickness and the penetration time of the gloves (EN 374), "suit protecting against chemicals" needs to be specified.
Reliability	4
Acceptability	acceptable
Remarks	The contents of the safety data sheet for the active substance need to be adjusted according to the conclusions above.
Date	2008/10/16 - environmental
Results and discussion	The LC50 procambarus clarkii is 0.000062 mg/l, the a.s. is not readily biodegradable and the logPOW is 6.0 and respectively 5.9. Therefore Cyfluthrin has to be classified and labelled with N R50/53 in accordance to the EC Directive 67/ 548/EEC. Based on an identified risk and as decided by the applicant a label should be included that prohibit the use of products containing Cyfluthrin in animal housings where exposure to the STP or direct emission to surface water cannot be prevented The data concerning waste treatment and handling are incorrect. The applicant does not mention the correct waste classification according to the European waste list 2001/118/EEC.Therefore the Waste-Number has to be given in the safety data sheet, the user manual and all documents for the waste management. The requirements of the EU Directive 88/379/EWG have also to be fulfilled.
Conclusion	The classification as N R50/53should be amended. The six-digit code for wastes from the manufacture, formulation, supply and use (MFSU) wood preserving agents and other biocides should be start with 07 04 XX In accordance with EU Directive 67/548/EWG labelling with S-phrases has to be added (S 60 > "The material and its container must be disposed of as hazardous waste"; S 61 > "Avoid release to the environment and refer to special instructions/material safety data sheet"). Please adjust the six-digit code for waste from MFSU and the right EC50, LC50 and IC50 in safety data sheet.
Acceptability	Acceptable, but incomplete

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Remarks	In the German regulation a label showing a cancelled dustbin is used to explain that the substance may not be disposed of as domestic waste. It is recommended to affix this label on products used in the professional and non professional sector.
	COMMENTS FROM ...
Date	*Give date of comments submitted*
Results and discussion	*Discuss additional relevant discrepancies referring to the (sub)heading numbers and to applicant´s summary and conclusion.* *Discuss if deviating from view of rapporteur member state*
Conclusion	*Discuss if deviating from view of rapporteur member state*
Reliability	*Discuss if deviating from view of rapporteur member state*
Acceptability	*Discuss if deviating from view of rapporteur member state*
Remarks	

SECTION A9 **ANNEX POINT IX**	**CLASSIFICATION AND LABELLING**	
	PROPOSED CLASSIFICATION AND LABELLING	
Class of danger	T Toxic N Dangerous for the environment	X
Hazard symbol		X
		
R phrases	R23 Toxic by inhalation R22 Harmful if swallowed R50/53 Very toxic to aquatic organisms may cause long-term adverse effects in the aquatic environment	X
S phrases	S1/2 Keep locked up and out of reach of children S24 Avoid contact with skin S36/37/39 Wear suitable protective clothing, gloves and eye/face protection S45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible) S60 This material and its container must be disposed of as hazardous waste S61 Avoid release to the environment. Refer to special instructions/safety data sheet	

Evaluation by Competent Authorities	
	Use separate "evaluation boxes" to provide transparency as to the comments and views submitted
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	2010/07/09
Materials and methods	Not applicable
Conclusion	Not applicable
Reliability	Not applicable
Acceptability	Not applicable
Remarks	The proposal of the CA is different from the applicant's proposal. The proposed classification of the RMS is consistent with the Directive 67/548/EEC (incl. 31st ATP): T^+,N, R28, R23, R50/53 The current legal classification and labelling with T+, R28 is based on the LD_{50} of 16 mg/kg bw cyfluthrin in cremophor EL. According to Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures (CLP-Regulation) the a.s. has to be classified as Acute Category I and Chronic Category I (H400/ H410) which means "Very toxic to aquatic life with long lasting effects" and has to be labelled with the hazard pictogram Warning - Hazardous to the aquatic environment. The legal classification according to Regulation (EC) No 1272/2008 based on tioxicological properties of cyfluthrin (Acute Tox.3, H331; Acute Tox. 2, H300) is marked as a "minimum classification". This indicates that the direct translation which was not done case-by-case but in a categorized manner might have led to a less severe classification (in this case for inhalation: Acute Tox. 3, H331) than the existing data would imply (Acute Tox. 2, H330) because the hazard categories in GHS are not directly compatible with the criteria for classification in 67/548/EEC. As outlined in Regulation No 1272/2008, in cases where there is "access to data or other information as specified in Part 1 of Annex I that lead to classification in a more severe category compared to the minimum classification, "classification in the more severe category must then be applied". Thus, for cyfluthrin "Acute Tox. 2, H300" for acute oral toxicity and the more severe classification "Acute Tox. 2, H330" for acute inhalation toxicity based on an LC_{50} of 0.4 mg/L x 4 h aerosol has to be applied since the upper limit for Cat. 2 in GHS is 0.5 mg/L. Based on an identified risk and as decided by the applicant a label should be included that prohibits the use of products containing Cyfluthrin in animal housings where exposure to the STP or direct emission to surface water cannot be prevented.
	COMMENTS FROM ...
Date	*Give date of comments submitted*
Results and discussion	*Discuss additional relevant discrepancies referring to the (sub)heading numbers and to applicant´s summary and conclusion.* *Discuss if deviating from view of rapporteur member state*
Conclusion	*Discuss if deviating from view of rapporteur member state*
Reliability	*Discuss if deviating from view of rapporteur member state*
Acceptability	*Discuss if deviating from view of rapporteur member state*
Remarks	

Title

LITERATURE SEARCH

CYFLUTHRIN

Code: FCR 1272

CAS-No: 68359-37-5

Data Requirements

Technical Guidance Document in Support of the Directive 98/8/EC concerning the Placing of Biocidal Products on the Market

Final Draft

Version 4.3.2 (October 2000)

Technical Notes for Guidance on Dossier Preparation including preparation and evaluation of study summaries under Directive 98/8/EC concerning the Placing of Biocidal Products on the Market

Final Draft

Version 4.3.2 (June 2002)

Completed on

April 2006

Company

Bayer Environmental Science

Global Regulatory Affairs

16, rue Jean-Marie Leclair

F-69009 Lyon

France

Introduction

Objectives : search publications on mammalian toxicity of cyfluthrin.

Results :

• The research was conducted on databases provided by STN with the interface STNExpress v8. The CAS registry number and the different common names for cyfluthrin were used as search terms, associated with search terms for the mammalian and human topic (MAMMA? OR HUMAN OR OCCUPATION? OR MAN OR WOMAN OR CHILD OR WORKER OR PREGNAN? OR OCCUPATIONAL) and search terms on toxicity (TOXIC? OR POISON? OR ACUTE OR CHRONIC? OR LETHAL? OR CLINIC? OR MUTAGEN? OR CARCINOGEN? OR CANCER? OR TUMORIGEN? OR EXPOSURE OR RISK OR MEDICAL OR HEALTH? OR ADVERSE OR REPRODUCTIVE OR DERMAL).

• The bibliographic search was performed on databases of the clusters TOXICOLOGY and SAFETY. Informations are available for cyfluthrin on the databases HSDB, RTECS, MSDS-OHS, BIOSIS, TOXCENTER, CAPLUS, EMBASE, CSNB, HEALSAFE and DISSABS.

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* * * * * * * * *   Welcome to STN International   * * * * * * * * * *
* * * * * * * * * * * * * * STN  Karlsruhe * * * * * * * * * * * * * *

L1   ANSWER 1 OF 1  REGISTRY  COPYRIGHT 2006 ACS on STN
RN   68359-37-5  REGISTRY
ED   Entered STN:  16 Nov 1984
CN   Cyclopropanecarboxylic acid, 3-(2,2-dichloroethenyl)-2,2-dimethyl-,
     cyano(4-fluoro-3-phenoxyphenyl)methyl ester (9CI)  (CA INDEX NAME)
OTHER NAMES:
CN   α-Cyano-3-phenoxy-4-fluorobenzyl 2,2-dimethyl-3-(2,2-
     dichlorovinyl)cyclopropanecarboxylate
CN   BAY-FCR 1272
CN   BAY-Vl 1704
CN   Baythroid
CN   Baythroid XL
CN   Beta-Baythroid
CN   Beta-cyfluthrin
CN   Bulldock
CN   Bulldock 125SC
CN   Cyfluthrin
CN   Cyfoxylate
CN   Eulan SP
CN   FCR 1272
CN   FCR 4545
CN   Optem PT 600
CN   Solfac
CN   Syfrutrin
CN   Tempo 2
FS   3D CONCORD
DR   85782-82-7, 83855-46-3
MF   C22 H18 Cl2 F N O3
CI   COM
LC   STN Files:   AGRICOLA, ANABSTR, AQUIRE, BEILSTEIN*, BIOSIS, BIOTECHNO, CA,
       CABA, CAPLUS, CASREACT, CBNB, CHEMCATS, CHEMLIST, CIN, CSCHEM, CSNB,
       DDFU, DRUGU, EMBASE, HSDB*, IFICDB, IFIUDB, MEDLINE, MRCK*, MSDS-OHS,
       NIOSHTIC, PATDPASPC, PROMT, RTECS*, TOXCENTER, ULIDAT, USAN, USPAT2,
       USPATFULL, VETU
         (*File contains numerically searchable property data)
     Other Sources:   EINECS**
         (**Enter CHEMLIST File for up-to-date regulatory information)
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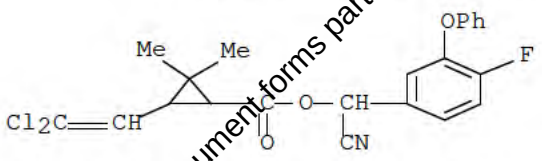


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**PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT**

          1162 REFERENCES IN FILE CA (1907 TO DATE)
            45 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
          1167 REFERENCES IN FILE CAPLUS (1907 TO DATE)

l1 Registry
=> s l1
E1 THROUGH E21 ASSIGNED

E1           2     A-CYANO-3-PHENOXY-4-FLUOROBENZYL 2,2-DIMETHYL-3-(2,2-D
                   ICHLOROVINYL)CYCLOPROPANECARBOXYLATE/BI
E2           2     BAY-FCR 1272/BI
E3           2     BAY-VL 1704/BI
```

```
E4            2     BAYTHROID XL/BI
E5            2     BAYTHROID/BI
E6            2     BETA-BAYTHROID/BI
E7            2     BETA-CYFLUTHRIN/BI
E8            2     BULLDOCK 125SC/BI
E9            2     BULLDOCK/BI
E10           2     CYFLUTHRIN/BI
E11           2     CYFOXYLATE/BI
E12           2     EULAN SP/BI
E13           2     FCR 1272/BI
E14           2     FCR 4545/BI
E15           2     OPTEM PT 600/BI
E16           2     SOLFAC/BI
E17           2     SYFRUTRIN/BI
E18           2     TEMPO 2/BI
E19           1     68359-37-5/BI
E20           1     83855-46-3/BI
E21           1     85782-82-7/BI

=> index toxicology safety

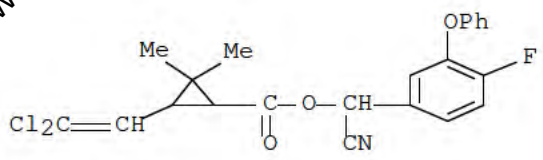
L7    QUE (("A-CYANO-3-PHENOXY-4-FLUOROBENZYL 2,2-DIMETHYL-3-(2,2-DICHLORO
          VINYL)CYCLOPROPANECARBOXYLATE"/BI OR "BAY-FCR 1272"/BI OR "BAY-VL 1704
          "/BI OR "BAYTHROID XL"/BI OR BAYTHROID/BI OR BETA-BAYTHROID/BI OR BETA
          -CYFLUTHRIN/BI OR "BULLDOCK 125SC"/BI OR BULLDOCK/BI OR CYFLUTHRIN/BI
          OR CYFOXYLATE/BI OR "EULAN SP"/BI OR "FCR 1272"/BI OR "FCR 4545"/BI OR
           "OPTEM PT 600"/BI OR SOLFAC/BI OR SYFRUTRIN/BI OR "TEMPO 2"/BI OR 683
          59-37-5/BI OR 83855-46-3/BI OR 85782-82-7/BI)) AND (HUMAN OR MAMMAL? O
          R MAN OR WOMAN OR INFANT? OR CHILD OR PREGNAN? OR OCCUPATIONAL? OR WOR
          KER OR PATIENT) NOT P/DT

L8    QUE L7 AND (TOXIC? OR POISON? OR ACUTE OR CHRONIC? OR LETHAL? OR CLINIC? O
          R MUTAGEN? OR CARCINOGEN? OR CANCER? OR TUMORIGEN? OR EXPOSURE OR RISK
           OR MEDICAL OR HEALTH? OR ADVERSE OR REPRODUCTIVE OR DERMAL)
```

The Hazardous Substances Data Bank (HSDB), is a factual, nonbibliographic database from the Toxicology Program of the National Library of Medicine. It contains information on toxicology and the environmental effects of chemicals.

This file contains CAS Registry Numbers for easy and accurate substance identification.

L2 ANSWER 1 OF 1 HSDB COPYRIGHT 2006 NLM on STN
CAS Registry No. (RN): 68359-37-5 HSDB
HSDB Number (HSN): 6599
Last Rev. Date (RDAT): Mar. 5, 2003
Update History:
Reviewed by SRP on 9/18/1997
Complete Update on 03/05/2003, 1 field added/edited/deleted.
Field Update on 08/08/2001, 1 field added/edited/deleted.
Field Update on 05/16/2001, 1 field added/edited/deleted.
Complete Update on 09/12/2000, 1 field added/edited/deleted.
Complete Update on 06/12/2000, 1 field added/edited/deleted.
Complete Update on 02/08/2000, 1 field added/edited/deleted.
Complete Update on 02/02/2000, 1 field added/edited/deleted.
Complete Update on 09/21/1999, 1 field added/edited/deleted.
Complete Update on 08/27/1999, 1 field added/edited/deleted.
Complete Update on 06/03/1998, 45 fields added/edited/deleted.
Field Update on 06/03/1998, 1 field added/edited/deleted.
Field Update on 11/01/1997, 1 field added/edited/deleted.
Field Update on 05/09/1997, 1 field added/edited/deleted.
Field Update on 05/01/1997, 2 fields added/edited/deleted.
Field Update on 03/06/1997, 1 field added/edited/deleted.
Complete Update on 10/20/1996, 1 field added/edited/deleted.
Complete Update on 05/14/1996, 1 field added/edited/deleted.
Complete Update on 02/01/1996, 1 field added/edited/deleted.
Complete Update on 08/21/1995, 1 field added/edited/deleted.
Complete Update on 11/28/1994, 1 field added/edited/deleted.
Complete Update on 03/01/1994, 30 fields added/edited/deleted.
Chemical Name (CN): CYFLUTHRIN
Synonyms (CN): BAY-FCR 1272 **PEER REVIEWED**; Baythroid **PEER REVIEWED**; Baythroid H **PEER REVIEWED**; (R,S)-alpha-Cyano-4-fluoro-3-phenoxybenzyl-(1R,S)-cis,trans-3-(2,2- dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate **PEER REVIEWED**; Cyano(4-fluoro-3-phenoxyphenyl)methyl 3-(2,2-dichloroethenyl)-2,2-dimethyl-cyclopropanecarboxylate **PEER REVIEWED**; Cyfluthrine **PEER REVIEWED**; Cyfoxylate **PEER REVIEWED**; 3-(2,2-Dichloroethenyl)-2,2-diethylcyclopropanecarboxylic acid cyano(4-fluoro- 3-phenoxyphenyl)methyl ester **PEER REVIEWED**; FCR 1272 **PEER REVIEWED**; Responsar **PEER REVIEWED**; (RS)-alpha-Cyano-4-fluoro-3-phenoxybenzyl (1RS, 3RS: 1RS, 3SR)-3-(2,2- dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate **PEER REVIEWED**; Solfac **PEER REVIEWED**; Tempo **PEER REVIEWED**
Molecular Formula (MF): C22 H18 Cl2 F N O3 **PEER REVIEWED**
Molecular Weight (MW): 434.29
Character Count (CHC): 84472



Manufacture/Use Information

Composition (COMP):
Emulsifiable concentrate; water-in-oil emulsion; ULV liquid; wettable powder; granules. **PEER REVIEWED** [Hartley, D. and H. Kidd (eds.). The Agrochemicals Handbook. 2nd ed. Lechworth, Herts, England: The Royal Society of Chemistry, 1987., p. A799/Aug 87]
Mixed formulations: (cyfluthrin+)phoxim; dichlorvos + propoxur **PEER REVIEWED** [Hartley, D. and H. Kidd (eds.). The Agrochemicals Handbook. 2nd ed. Lechworth, Herts, England: The Royal Society of Chemistry, 1987., p. A799/Aug 87]

Corporate Name (of Producer/Manufacturer) (CO):,
Bayer Inc., Hq, One Mellon Center, 500 Grant St, Pittsburgh, PA 15219-2502, (412) 394-5500; Agriculture Division, Hawthorn Rd, PO Box 4913, Kansas City, MO 64120; Production Site: Kansas City, MO 64120, Shawnee, KS 66216 **PEER REVIEWED** [SRI. 1996 Directory of Chemical Producers-United States of America. Menlo Park, CA: SRI International, 1996., p. 786]

Notes (NTE):
Synthetic pyrethroid insecticide. Commercial product is mixture of 8 isomers, the (1R)-isomers primarily responsible for the bioactivity. **PEER REVIEWED** [Budavari, S. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 1996., p. 466]
The technical product consists of a mixture of 4 diastereoisomeric pairs. /Technical cyfluthrin/ **PEER REVIEWED** [Hartley, D. and H. Kidd (eds.). The Agrochemicals Handbook. 2nd ed. Lechworth, Herts, England: The Royal Society of Chemistry, 1987., p. A799/Aug 87]
Compatible with most other pesticides but incompatible with azocyclotin. **PEER REVIEWED** [Hartley, D. and H. Kidd (eds.). The Agrochemicals Handbook. 2nd ed. Lechworth, Herts, England: The Royal Society of Chemistry, 1987., p. A799/Aug 87]
Non-phytotoxic when used as directed. **PEER REVIEWED** [Hartley, D. and H. Kidd (eds.). The Agrochemicals Handbook. 2nd ed. Lechworth, Herts, England: The Royal Society of Chemistry, 1987., p. A799/Aug 87]
/Pyrethroids/ are modern synthetic insecticides similar chemically to natural pyrethrins, but modified to increase stability in the natural environment. /Pyrethroids/ **PEER REVIEWED** [Morgan DP; Recognition and Management of Pesticide Poisonings. 4th ed. p.34 EPA 540/9-88-001. Washington, DC: U.S. Government Printing Office, March 1989]

Application (APP):
Agricultural insecticide **PEER REVIEWED** [Budavari, S. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 1996., p. 466]
Control of chewing and sucking insects on oilseed rape (cabbage stem flea beetle and rape winter stem weevil), cereals (Caphids vectors of BYDV), ornamentals, maize, cotton, groundnuts, potatoes, rice, lucerne, tobacco, sugar beet, deciduous fruit, and vegetables. Control of insect pests, especially houseflies, mosquitos, and cockroaches in public health, stored products, and domestic usage. **PEER REVIEWED** [Hartley, D. and H. Kidd (eds.). The Agrochemicals Handbook. 2nd ed. Lechworth, Herts, England: The Royal Society of Chemistry, 1987., p. A799/Aug 87]
MEDICATION **PEER REVIEWED**

Physical and Chemical Properties

Crystal Property Desc. (CPD):
Yellowish-brown oil **PEER REVIEWED** [Budavari, S. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse

Station, NJ: Merck and Co., Inc., 1996., p. 466]
Viscous amber partly crystalline oil. **PEER REVIEWED** [Hartley, D. and H. Kidd (eds.). The Agrochemicals Handbook. 2nd ed. Lechworth, Herts, England: The Royal Society of Chemistry, 1987., p. A799/Aug 87]

Odor (ODOR):
Aromatic solvent odor at room temp **PEER REVIEWED** [Purdue University; National Pesticide Information Retrieval System, Cyfluthrin Fact Sheet No. 164 (1987)]

Melting Point (MP):
60 deg C **PEER REVIEWED** [Lide, D.R. (ed.). CRC Handbook of Chemistry and Physics. 76th ed. Boca Raton, FL: CRC Press Inc., 1995-1996., p. 3-139]

Octanol/Water Dist. Coeff. (LKOW):
log Kow = 5.94 **PEER REVIEWED** [Tomlin, C.D.S. (ed.). The Pesticide Manual - World Compendium. 10th ed. Surrey, UK: The British Crop Protection Council, 1994., p. 248]

Solubility (SLB):
Solubility in water is 2 mg/l at 20 deg C. **PEER REVIEWED** [Shiu WY et al; Rev Environ Contam Toxicol 116: 15-187 (1990)]

Spectral Properties (SPECT):
Index of refraction: 1.5511 at 23 deg C/D **PEER REVIEWED** [Budavari, S. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 1996., p. 466]

Vapor Pressure (VP):
2.03E-09 mm Hg at 25 deg C **PEER REVIEWED** [Tomlin, C.D.S. (ed.). The Pesticide Manual - World Compendium. 10th ed. Surrey, UK: The British Crop Protection Council, 1994., p. 248]

Other Properties (OCPP):
Colorless oil; specific optical rotation: -15.0 deg at 20 deg C/D (concentration by volume= 1.0 g in 100 ml chloroform)/(1R)(3R)(alphaR)-cyfluthrin. **PEER REVIEWED** [Budavari, S. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 1996., p. 466]
Pasty yellow mass; it contains 23-26% (R 1R)-cis- + (S 1S)-cis- enantiomers (mp 57 deg C), 19-19% (S 1R)-cis-(mp 74 deg C), 33-36% (R 1R)-trans- + (S 1S)-trans-(mp 75 deg C), 22-25% (S 1R)- trans- + (R 1S)-trans-(mp 102 deg C) /Technical cyfluthrin/ **PEER REVIEWED** [Worthing, C.R. and S.B. Walker (eds.). The Pesticide Manual - A World Compendium. 8th ed. Thornton Heath, UK: The British Crop Protection Council, 1987., p. 205]
Crystals from m-hexane; mp: 68-69 deg C; specific optical rotation: -2.1 deg at 20 deg C/D (concentration by volume= 1.0 g in 100 ml chloroform) /(1R)(3S)(alpha S)-cyfluthrin/ **PEER REVIEWED** [Budavari, S. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 1996., p. 466]
Crystals; mp: 50-52 deg C; specific optical rotation: +24.5 deg at 20 deg C/D (concentration by volume= 1.0 g in 100 ml chloroform) /(1R)(3R)(alpha S)- Cyfluthrin/ **PEER REVIEWED** [Budavari, S. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 1996., p. 466]

Safety and Handling

Fire Potential (FPOT):
/Pyrethrins/ ... burn with difficulty. /Pyrethrins/ **PEER REVIEWED**

[Bureau of Explosives; Emergency Handling of Haz Matl in Surface Trans p.434 (1981)]

Fire Fighting Procedure (FIRP):
Use carbon dioxide, foam, or dry chemical /on fires involving pyrethroids/. /Pyrethrum/ **PEER REVIEWED** [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2]
Fire-fighting: Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive-pressure mode. /Pyrethrum/ **PEER REVIEWED** [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 5]
Extinguish fire using agent suitable for type of surrounding fire. /Pyrethrins/ **PEER REVIEWED** [Bureau of Explosives; Emergency Handling of Haz Matl in Surface Trans p.434 (1981)]

Reaction and Incompatability (REAC):
Incompatible with azocyclotin. **PEER REVIEWED** [Hartley, D. and H. Kidd (eds.). The Agrochemicals Handbook. 2nd ed. Lechworth, Herts, England: The Royal Society of Chemistry, 1987., p. A799/Aug 87]
Incompatibility: Strong oxidizers. /Pyrethrum/ **PEER REVIEWED** [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 270]
... Incompatible with lime & ordinary soaps, because acids & alkalies speed up processes of hydrolysis. /Pyrethrins/ **PEER REVIEWED** [Farm Chemicals Handbook 1997. Willoughby, OH: Meister Publishing Co., 1997., p. C311]

Irritation (Skin, Eye, and Respiratory) (IRR):
Immediately irritating to the eyes. /Pyrethrum/ **PEER REVIEWED** [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 270]
The chief effect from exposure ... is skin rash particularly on moist areas of the skin. ... May irritate the eyes. **PEER REVIEWED** [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 1]

Personal Safety Precautions (PSP):
Employees should be provided with and required to use dust- and splash-proof safety goggles where /pyrethroids/ ... may contact the eyes. /Pyrethroids/ **PEER REVIEWED** [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3]
Employees should be provided with and be required to use impervious clothing, gloves, and face shields (eight-inch minimum). /Pyrethroids/ **PEER REVIEWED** [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2]
Wear appropriate equipment to prevent: Repeated or prolonged skin contact. /Pyrethrum / **PEER REVIEWED** [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 270]

Wear appropriate eye protection to prevent eye contact. /Pyrethrum/ **PEER REVIEWED** [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 270]

Recommendations for respirator selection. Max concn for use: 50 mg/cu m: Respirator Classes: Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter. May require eye protection. Any supplied-air respirator. May require eye protection. Any self-contained breathing apparatus. May require eye protection. /Pyrethrum/ **PEER REVIEWED** [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 270]

Recommendations for respirator selection. Max concn for use: 125 mg/cu m: Respirator Classes: Any supplied-air respirator operated in a continuous flow mode. May require eye protection. Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter. May require eye protection. /Pyrethrum/ **PEER REVIEWED** [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 270]

Recommendations for respirator selection. Max concn for use: 250 mg/cu m: Respirator Classes: Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter. Any self-contained breathing apparatus with a full facepiece. Any supplied-air respirator with a full facepiece. Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter. May require eye protection. /Pyrethrum/ **PEER REVIEWED** [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 270]

Recommendations for respirator selection. Max concn for use: 5,000 mg/cu m: Respirator Class: Any supplied-air respirator with a full facepiece and operated in a pressure-demand or other positive pressure mode. /Pyrethrum/ **PEER REVIEWED** [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 270]

Recommendations for respirator selection. Condition: Emergency or planned entry into unknown concn or IDLH conditions: Respirator Classes: Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive pressure mode. Any supplied-air respirator with a full face piece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode. /Pyrethrum/ **PEER REVIEWED** [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 270]

Recommendations for respirator selection. Condition: Escape from suddenly occurring respiratory hazards: Respirator Classes: Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter. Any appropriate escape-type, self-contained breathing apparatus. /Pyrethrum/ **PEER REVIEWED** [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 270]

Other Preventative Measures (OPRM):

Skin that becomes contaminated with /pyrethrum/ should be promptly washed or showered with soap or mild detergent and water. /Pyrethrum/ **PEER REVIEWED** [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr.

(eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3]

Clothing contaminated with /pyrethrum/ should be placed in closed containers for storage until provision is made for the removal of /pyrethrum/ from the clothing. /Pyrethrum/ **PEER REVIEWED** [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2]

Respirators may be used when engineering and work practice controls are not technically feasible, when such controls are in the process of being installed, or when they fail or need to be supplemented. Respirators may also be used for operations which require entry into tanks or closed vessels, and in emergency situations. /Pyrethrum/ **PEER REVIEWED** [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2]

Employees who handle /pyrethrum/ ... should wash their hands thoroughly with soap or mild detergent and water before eating, smoking, or using toilet facilities. /Pyrethrum/ **PEER REVIEWED** [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3]

Avoid contact with skin. Keep out of any body of water. Do not contaminate water by cleaning of equipment or disposal of waste. Do not reuse empty container. Destroy it by perforating or crushing. Bury or discard in a safe place away from water supplies. /Pyrethrins/ **PEER REVIEWED** [Farm Chemicals Handbook 1997. Willoughby, OH: Meister Publishing Co., 1997., p. C311]

SRP: The scientific literature for the use of contact lenses in industry is conflicting. The benefit or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place. **PEER REVIEWED**

Contact lenses should not be worn when working with this chemical. /Pyrethrum/ **PEER REVIEWED** [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 270]

The worker should immediately wash the skin when it becomes contaminated. /Pyrethrum/ **PEER REVIEWED** [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 270]

Workers whose clothing may have become contaminated should change into uncontaminated clothing before leaving the work premises. /Pyrethrum/ **PEER REVIEWED** [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 270]

Work clothing that becomes wet or significantly contaminated should be removed and replaced. /Pyrethrum/ **PEER REVIEWED** [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 270]

If /pyrethrins/ are not involved in a fire: keep /pyrethrins/ out of water sources and sewers. Build dikes to contain flow as necessary. /Pyrethrins/

PEER REVIEWED [Bureau of Explosives; Emergency Handling of Haz Matl in Surface Trans p.434 (1981)]

Stability and Shelf Life (STAB):

Pyrethrins ... /are/ stable for long periods in water-based aerosols where ... emulsifiers give neutral water systems. /Pyrethrins/ **PEER REVIEWED** [Farm Chemicals Handbook 1997. Willoughby, OH: Meister Publishing Co., 1997., p. C311]

Thermally stable @ room temp. **PEER REVIEWED** [Tomlin, C.D.S. (ed.). The Pesticide Manual - World Compendium. 10th ed. Surrey, UK: The British Crop Protection Council, 1994., p. 250]

Storage (STRG):

Pyrethrins with piperonyl butoxide topical preparations should be stored in well-closed containers at a temperature less than 40 deg C, preferably between 15-30 deg C. /Pyrethrins/ **PEER REVIEWED** [McEvoy, G.K. (ed.). American Hospital Formulary Service - Drug Information 92. Bethesda, MD: American Society of Hospital Pharmacists, Inc., 1992 (Plus Supplements 1992)., p. 2125]

Cleanup Methods (CLUP):

Environmental consideration - Land spill: Dig a pit, pond, lagoon, or holding area to contain liquid or solid material. /SRP: If time permits, pits, ponds, lagoons, soak holes, or holding areas should be sealed with an impermeable flexible membrane liner./ Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash, or cement powder. /Pyrethrins/ **PEER REVIEWED** [Bureau of Explosives; Emergency Handling of Haz Matl in Surface Trans p.434 (1981)]

Environmental consideration - Water spill: If /pyrethrins/ are dissolved, apply activated carbon at ten times the spilled amount in the region of 10 ppm or greater concn. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. /Pyrethrins/ **PEER REVIEWED** [Bureau of Explosives; Emergency Handling of Haz Matl in Surface Trans p.434 (1981)]

Disposal Methods (DSM):

SRP: At the time of review, criteria for land treatment or burial (sanitary landfill) disposal practices are subject to significant revision. Prior to implementing land disposal of waste residue (including waste sludge), consult with environmental regulatory agencies for guidance on acceptable disposal practices. **PEER REVIEWED**

Incineration would be an effective disposal procedure where permitted. If an efficient incinerator is not available, the product should be mixed with large amounts of combustible material and contact with the smoke should be avoided. /Pyrethrin products/ **PEER REVIEWED** [Sittig, M. Handbook of Toxic and Hazardous Chemicals and Carcinogens, 1985. 2nd ed. Park Ridge, NJ: Noyes Data Corporation, 1985., p. 762]

The following wastewater treatment technology has been investigated for chlorinated pesticides: Concentration process: Resin adsorption. /Chlorinated pesticides/ **PEER REVIEWED** [USEPA; Management of Hazardous Waste Leachate, EPA Contract No.68-03-2766 p.E-195 (1982)]

The following wastewater treatment technology has been investigated for chlorinated pesticides: Concentration process: Resin adsorption. /Chlorinated pesticides/ **PEER REVIEWED** [USEPA; Management of Hazardous Waste Leachate, EPA Contract No.68-03-2766 p.E-195 (1982)]

Toxicity

Antidote and Emergency Treatment (ANTR):

No specific antidote known. Symptomatic treatment. **PEER REVIEWED**

[Hartley, D. and H. Kidd (eds.). The Agrochemicals Handbook. 2nd ed. Lechworth, Herts, England: The Royal Society of Chemistry, 1987., p. A799/Aug 87]

Treatment is supportive, and most casual exposures require only decontamination. Topical vitamin E may ameliorate the paresthesias that accompany contact with synthetic pyrethroids containing an alpha-cyano group (e.g., fenvalerate, cypermethrin, flucythrinate). /Synthetic pyrethroids/ **PEER REVIEWED** [Ellenhorn, M.J. and D.G. Barceloux. Medical Toxicology - Diagnosis and Treatment of Human Poisoning. New York, NY: Elsevier Science Publishing Co., Inc. 1988., p. 1081]

To minimize absorption of pyrethrins and piperonyl butoxide following ingestion, gastric lavage should be performed immediately and saline cathartics administered. Treatment of overdosage mainly involves symptomatic and supportive care. /Pyrethrins/ **PEER REVIEWED** [McEvoy, G.K. (ed.). American Hospital Formulary Service - Drug Information 92. Bethesda, MD: American Society of Hospital Pharmacists, Inc., 1992 (Plus Supplements 1992)., p. 2126]

Skin contamination should be removed by washing with soap and water. If irritant or paresthetic effects occur, treatment by a physician should be obtained. Because /vapor exposure/ of pyrethroid apparently accounts for paresthesia affecting the face, strenuous measures should be taken (ventilation, protective face mask and hood) to avoid vapor contact with the face and eyes. Vitamin E Oil preparations (dl-alpha tocopheryl acetate) are uniquely effective in preventing and stopping the paresthetic reaction. They are safe for application to the skin under field conditions. Corn oil is somewhat effective, but possible side effects with continuing use make it less suitable. Vaseline is less effective than corn oil and zinc oxide actually worsens the reaction. /Pyrethroids/ **PEER REVIEWED** [Morgan DP; Recognition and Management of Pesticide Poisonings. 4th ed. p.36 EPA540/9-88-001. Washington, DC: U.S. Government Printing Office, March 1989]

Eye contamination should be treated immediately by prolonged flushing of the eye with copious amounts of clean water or saline. If irritation persists, professional ophthalmologic care should be obtained. ... Extraordinary measures should be taken to avoid eye and skin contamination with this product. Should accidental eye contamination occur, expert ophthalmologic care should be obtained after flushing the eye free of the chemical with copious amounts of clean water. /Pyrethroids/ **PEER REVIEWED** [Morgan DP; Recognition and Management of Pesticide Poisonings. 4th ed. p.36 EPA 540/9-88-001. Washington, DC: U.S. Government Printing Office, March 1989]

Ingestion of pyrethroid insecticide presents relatively little risk. However, if large amounts have been ingested, empty the stomach by intubation, aspiration, and lavage. Based on observations in laboratory animals, large ingestions of either allethrin, cismethrin, fenvalerate or deltamethrin would be the most likely to generate neurotoxic manifestations. /Pyrethroids/ **PEER REVIEWED** [Morgan DP; Recognition and Management of Pesticide Poisonings. 4th ed. p.36 EPA 540/9-88-001. Washington, DC: U.S. Government Printing Office, March 1989]

If only small amounts of pyrethroid have been ingested, or if treatment has been delayed, oral administration of activated charcoal and cathartic probably represents optimal management. /Pyrethroids/ **PEER REVIEWED** [Morgan DP; Recognition and Management of Pesticide Poisonings. 4th ed. p.36 EPA 540/9-88-001. Washington, DC: U.S. Government Printing Office, March 1989]

Medical Surveillance (MEDS):

Initial medical screening: Employees should be screened for history of certain medical conditions ... which might place the employee at increased risk from /pyrethroid/ exposure. Chronic respiratory disease: In persons with chronic respiratory disease, especially asthma, the inhalation of

/pyrethroids/ might cause exacerbation of symptoms due to its sensitizing properities. Skin disease: /Pyrethroids/ can cause dermatitis which may be allergic in nature. Persons with pre-existing skin disorders may be more susceptible to the effects of this agent. Any employee developing the above-listed conditions should be referred for further medical examination. /Pyrethrum/ **PEER REVIEWED** [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 1]

Human Toxicity Excerpt (HTXE):

Recently, synthetic pyrethroids have been shown to elicit cutaneous paresthesias in workers handling this insecticide. /Pyrethroids/ **PEER REVIEWED** [Zenz, C., O.B. Dickerson, E.P. Horvath. Occupational Medicine. 3rd ed. St. Louis, MO., 1994, p. 119]

The allergenic properties of pyrethroids /with early pyrethrum preparations/ are marked in comparison with other pesticides. Many cases of contact dermatitis and respiratory allergy have been reported. Persons sensitive to ragweed pollen are particularly prone to such reactions. Preparations containing synthetic pyrethroids are less likely to cause allergic reactions than are the preparations made from pyrethrum powder. /Pyrethroids/ **PEER REVIEWED** [Hardman, J.G., L.E. Limbird, P.B. Molinoff, R.W. Ruddon, A.G. Goodman (eds.). Goodman and Gilman's The Pharmacological Basis of Therapeutics. 9th ed. New York, NY: McGraw-Hill, 1996., p. 1687]

There have been very few systemic poisonings of humans by pyrethroids. /Pyrethroids/ **PEER REVIEWED** [Morgan DP; Recognition and Management of Pesticide Poisonings. 4th ed. p.35 EPA 540/9-88-001. Washington, DC: U.S. Government Printing Office, March 1989]

Pyrethroids are not cholinesterase inhibitors. /Pyrethroids/ **PEER REVIEWED** [Morgan DP; Recognition and Management of Pesticide Poisonings. 4th ed. p.35 EPA 540/9-88-001. Washington, DC: U.S. Government Printing Office, March 1989]

Extraordinary absorbed doses may rarely cause incoordination, tremor, salivation, vomiting, diarrhea, and irritability to sound and touch. /Pyrethroids/ **PEER REVIEWED** [Morgan DP; Recognition and Management of Pesticide Poisonings. 4th ed. p.35 EPA 540/9-88-001. Washington, DC: U.S. Government Printing Office, March 1989]

Some pyrethroid (eg, deltamethrin, fenvalerate, cyhalothrin, lambda-cyhalothrin, flucythrinate, and cypermethrin) may cause a transient itching and/or burning sensation in exposed human skin. /Synthetic pyrethroids/ **PEER REVIEWED** [WHO; Environmental Health Criteria 99: Cyhalothrin p.13 (1990)]

Non-Human Toxicity Excerpt (NTXE):

Non-irritating to skin, but a primary eye irritant (rabbits). **PEER REVIEWED** [Tomlin, C.D.S. (ed.). The Pesticide Manual - World Compendium. 10th ed. Surrey, UK: The British Crop Protection Council, 1994., p. 251]

In 2 yr feeding trials, no effect level for rats was 50, mice 200 mg/kg diet; non-carcinogenic and non-teratogenic in rats, and non-mutagenic in in vitro and in vivo tests. **PEER REVIEWED** [Hartley, D. and H. Kidd (eds.). The Agrochemicals Handbook. 2nd ed. Lechworth, Herts, England: The Royal Society of Chemistry, 1987., p. A799/Aug 87]

Non-toxic to bees (depending on mode of application). **PEER REVIEWED** [Tomlin, C.D.S. (ed.). The Pesticide Manual - World Compendium. 10th ed. Surrey, UK: The British Crop Protection Council, 1994., p. 251]

The type II pyrethroids /including cyfluthrin/ produce a complex poisoning syndrome and act on a wide range of tissues. They give sodium tail currents with relatively long time constants, which may be the reason for

their ability to act on the whole range of excitable tissues. Type II poisoning in rats involves progressive development of nosing and exaggerated jaw opening similar to that seen in response to an irritant placed on the tongue, salivation which may be profuse, increasing extensor tone in the hind limbs causing a rolling gait, incoordination progressing to a very coarse tremor, choreoform movements of the limbs and tail often precipitated by sensory stimuli, generalized choreoathetosis (writhing spasms), tonic seizures, apnea, and death. At lower doses more subtle repetitive behavior is seen. In dogs, similar symptoms are seen but salivation and upper airway hypersecretion and gastrointestinal symptoms are more prominent. **PEER REVIEWED** [Hayes, W.J., Jr., E.R. Laws, Jr., (eds.). Handbook of Pesticide Toxicology. Volume 2. Classes of Pesticides. New York, NY: Academic Press, Inc., 1991., p. 590]

Cyfluthrin is extremely toxic to fish and aquatic organisms but is practically non-toxic to upland game birds and waterfowl. **PEER REVIEWED** [Purdue University; National Pesticide Information Retrieval System, Cyfluthrin Fact Sheet No. 164 (1987)]

Synthetic pyrethroids are neuropoisons acting on the axons in the peripheral and central nervous systems by interacting with sodium channels in mammals and/or insects. A single dose produces toxic signs in mammals, such as tremors, hyperexcitability, salivation, choreoathetosis, and paralysis. ... At near-lethal dose levels, synthetic pyrethroids cause transient changes in the nervous system, such as axonal swelling and/or breaks and myelin degeneration in sciatic nerves. They are not considered to cause delayed neurotoxicity of the kind induced by some organophosphorus compounds. /Synthetic prethroids/ **PEER REVIEWED** [WHO; Environmental Health Criteria 99: Cyhalothrin p.13 (1990)]

Extreme doses /of pyrethroids/ have caused convulsions in laboratory animals. /Pyrethroids/ **PEER REVIEWED** [Morgan DP; Recognition and Management of Pesticide Poisonings. 4th ed. p.35 EPA 540/9-88-001. Washington, DC: U.S. Government Printing Office, March 1989]

Synthetic pyrethroids have been shown to be toxic for fish, aquatic arthropods, and honeybees in laboratory tests. But, in practical usage, no serious adverse effects have been noticed because of the low rates of application and lack of persistence in the environment. The toxicity of synthetic pyrethroids in birds and domestic animals is low. /Synthetic pyrethroids/ **PEER REVIEWED** [WHO; Environmental Health Criteria 99: Cyhalothrin p.13 (1990)]

The Type II /poisoning/ syndrome, also known as the "CS syndrome," is produced by those esters containing the alpha-cyano substituent and elicits intense hyperactivity, incoordination, and convulsions in cockroaches, whereas rats display burrowing behavior, coarse tremors, clonic seizures, sinuous writhing (choreoathetosis), and profuse salivation without lacrimation; hence the term CS (choreoathetosis/salivation) syndrome. /Pyrethroid esters containing the alpha-cyano substituent/ **PEER REVIEWED** [Amdur, M.O., J. Doull, C.D. Klaasen (eds). Casarett and Doull's Toxicology. 4th ed. New York, NY: Pergamon Press, 1991., p. 593]

The in vitro effects of pyrethroids on the mitogenic responsiveness of murine splenic lymphocytes to concanavalin A and lipopolysaccharide were determined. Allethrin was the most potent inhibitor, with effective concn in the range of 1X10-6 to 1.5X10-5 M. The results support the possibility of immune suppression by pyrethroid exposure. /Pyrethroids/ **PEER REVIEWED** [Stelzer KJ, Gordon MA; Res Commun Chem Pathol Pharmacol 46 (1): 137-50 (1984)]

Following absorption through the chitinous exoskeleton of arthropods, pyrethrins stimulate the nervous system, apparently by competitively interfering with cationic conductances in the lipid layer of nerve cells, thereby blocking nerve impulse transmissions. Paralysis and death follow. /Pyrethrins/ **PEER REVIEWED** [McEvoy, G.K. (ed.). American Hospital Formulary Service - Drug Information 92. Bethesda, MD: American Society of

Hospital Pharmacists, Inc., 1992 (Plus Supplements 1992)., p. 2125]

Non-Human Toxicity (NTOX):
LD50 Rat male oral 500-800 mg/kg, and in female rat 1,200 mg/kg **PEER REVIEWED** [Budavari, S. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 1996., p. 466]
LD50 Mouse male oral 300 mg/kg, and in female mouse 600 mg/kg **PEER REVIEWED** [Budavari, S. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 1996., p. 466]
LD50 Rat oral circa 500 mg/kg (in polyethyleneglycol) **PEER REVIEWED** [Tomlin, C.D.S. (ed.). The Pesticide Manual - World Compendium. 10th ed. Surrey, UK: The British Crop Protection Council, 1994., p. 251]
LD50 Rat oral circa 270 mg/kg (in xylene) **PEER REVIEWED** [Tomlin, C.D.S. (ed.). The Pesticide Manual - World Compendium. 10th ed. Surrey, UK: The British Crop Protection Council, 1994., p. 251]
LD50 Mouse oral circa 140 mg/kg **PEER REVIEWED** [Tomlin, C.D.S. (ed.). The Pesticide Manual - World Compendium. 10th ed. Surrey, UK: The British Crop Protection Council, 1994., p. 251]
LD50 Rat percutaneous (24 hr) >5,000 mg/kg **PEER REVIEWED** [Tomlin, C.D.S. (ed.). The Pesticide Manual - World Compendium. 10th ed. Surrey, UK: The British Crop Protection Council, 1994., p. 251]
LC50 Rat inhalation circa 0.1 mg/L/4 hr (aerosol) **PEER REVIEWED** [Tomlin, C.D.S. (ed.). The Pesticide Manual - World Compendium. 10th ed. Surrey, UK: The British Crop Protection Council, 1994., p. 251]
LC50 Rat inhalation 0.53 mg/L/4 hr (dust) **PEER REVIEWED** [Tomlin, C.D.S. (ed.). The Pesticide Manual - World Compendium. 10th ed. Surrey, UK: The British Crop Protection Council, 1994., p. 251]
NOEL Rat 125 mg/kg diet /90-day trial/ **PEER REVIEWED** [Tomlin, C.D.S. (ed.). The Pesticide Manual - World Compendium. 10th ed. Surrey, UK: The British Crop Protection Council, 1994., p. 251]
NOEL Dog 60 mg/kg diet /90-day trial/ **PEER REVIEWED** [Tomlin, C.D.S. (ed.). The Pesticide Manual - World Compendium. 10th ed. Surrey, UK: The British Crop Protection Council, 1994., p. 251]

Wildlife Toxicity (WLTX):
LC50 Golden orfe 330.9 ng/L/96 hr /Conditions of bioassay not specified/ **PEER REVIEWED** [Tomlin, C.D.S. (ed.). The Pesticide Manual - World Compendium. 10th ed. Surrey, UK: The British Crop Protection Council, 1994., p. 251]
LC50 Rainbow trout 89 ng/L/96 hr /Conditions of bioassay not specified/ **PEER REVIEWED** [Tomlin, C.D.S. (ed.). The Pesticide Manual - World Compendium. 10th ed. Surrey, UK: The British Crop Protection Council, 1994., p. 251]
LC50 Carp .022 mg/l/96 hr /Conditions of bioassay not specified/ **PEER REVIEWED** [Hartley, D. and H. Kidd (eds.). The Agrochemicals Handbook. 2nd ed. Lechworth, Herts, England: The Royal Society of Chemistry, 1987., p. A799/Aug 87]
LC50 Bluegill sunfish 28 ng/L/96 hr /Conditions of bioassay not specified/ **PEER REVIEWED** [Tomlin, C.D.S. (ed.). The Pesticide Manual - World Compendium. 10th ed. Surrey, UK: The British Crop Protection Council, 1994., p. 251]
LD50 Japanese quail oral >2,000 mg/kg **PEER REVIEWED** [Tomlin, C.D.S. (ed.). The Pesticide Manual - World Compendium. 10th ed. Surrey, UK: The British Crop Protection Council, 1994., p. 251]

Absorption, Distribution, and Excretion (ADE):
/PYRETHROIDS/ READILY PENETRATE INSECT CUTICLE AS SHOWN BY TOPICAL LD50 TO PERIPLANETA (COCKROACH) ... /PYRETHROIDS/ **PEER REVIEWED** [White-Stevens, R. (ed.). Pesticides in the Environment: Volume 1, Part 1,

Part 2. New York: Marcel Dekker, Inc., 1971., p. 75]

WHEN RADIOACTIVE PYRETHROID IS ADMIN ORALLY TO MAMMALS, IT IS ABSORBED FROM INTESTINAL TRACT OF THE ANIMALS & DISTRIBUTED IN EVERY TISSUE EXAMINED. EXCRETION OF RADIOACTIVITY IN RATS ADMIN TRANS-ISOMER: DOSAGE: 500 MG/KG; INTERVAL 20 DAYS; URINE 36%; FECES 64%; TOTAL 100%. /PYRETHROIDS/ **PEER REVIEWED** [MIYAMOTO J; ENVIRON HEALTH PERSPECT 14: 15-28 (1976)]

Pyrethrins are absorbed through intact skin when applied topically. When animals were exposed to aerosols of pyrethrins with piperonyl butoxide being released into the air, little or none of the combination was systemically absorbed. /Pyrethrins/ **PEER REVIEWED** [McEvoy, G.K. (ed.). American Hospital Formulary Service - Drug Information 92. Bethesda, MD: American Society of Hospital Pharmacists, Inc., 1992 (Plus Supplements 1992)., p. 2125]

Although limited absorption may account for the low toxicity of some pyrethroids, rapid biodegradation by mammalian liver enzymes (ester hydrolysis and oxidation) is probably the major factor responsible. Most pyrethroid metabolites are promptly excreted, at least in part, by the kidney. /Pyrethroids/ **PEER REVIEWED** [Morgan DP; Recognition and Management of Pesticide Poisonings. 4th ed. p.35 EPA 540/9-88-001. Washington, DC: U.S. Government Printing Office, March 1989]

In animals, beta-cyfluthrin was largely and very quickly eliminated; 98% was eliminated after 48 hr via the urine and the feces. **PEER REVIEWED** [Tomlin, C.D.S. (ed.). The Pesticide Manual - World Compendium. 10th ed. Surrey, UK: The British Crop Protection Council, 1994., p. 251]

Metabolism/Metabolites (METB):

The metabolic pathways for the breakdown of the pyrethroids vary little between mammalian species but vary somewhat with structure. ... Essentially, pyrethrum and allethrin are broken down mainly by oxidation of the isobutenyl side chain of the acid moiety and of the unsaturated side chain of the alcohol moiety with ester hydrolysis playing and important part, whereas for the other pyrethroids ester hydrolysis predominates. /Pyrethrum and pyrethroids/ **PEER REVIEWED** [Hayes, W.J., Jr., E.R. Laws, Jr., (eds.). Handbook of Pesticide Toxicology. Volume 2. Classes of Pesticides. New York, NY: Academic Press, Inc., 1991., p. 588]

The relative resistance of mammals to the pyrethroids is almost wholly attributable to their ability to hydrolyze the pyrethroids rapidly to their inactive acid and alcohol components, since direct injection into the mammalian CNS leads to a susceptibility similar to that seen in insects. Some additional resistance of homeothermic organisms can also be attributed to the negative temperature coefficient of action of the pyrethroids, which are thus less toxic at mammalian body temperatures, but the major effect is metabolic. Metabolic disposal of the pyrethroids is very rapid, which means that toxicity is high by the intravenous route, moderate by slower oral absorption, and often unmeasureably low by dermal absorption. /Pyrethroids/ **PEER REVIEWED** [Hayes, W.J., Jr., E.R. Laws, Jr., (eds.). Handbook of Pesticide Toxicology. Volume 2. Classes of Pesticides. New York, NY: Academic Press, Inc., 1991., p. 588]

FASTEST BREAKDOWN IS SEEN WITH PRIMARY ALCOHOL ESTERS OF TRANS-SUBSTITUTED ACIDS SINCE THEY UNDERGO RAPID HYDROLYTIC & OXIDATIVE ATTACK. FOR ALL SECONDARY ALCOHOL ESTERS & FOR PRIMARY ALCOHOL CIS-SUBSTITUTED CYCLOPROPANECARBOXYLATES, OXIDATIVE ATTACK IS PREDOMINANT. /PYRETHROIDS/ **PEER REVIEWED** [The Chemical Society. Foreign Compound Metabolism in Mammals. Volume 5: A Review of the Literature Published during 1976 and 1977. London: The Chemical Society, 1979., p. 469]

Pyrethrins are reportedly inactivated in the GI tract following ingestion. In animals, pyrethrins are rapidly metabolized to water soluble, inactive compounds. /Pyrethrins/ **PEER REVIEWED** [McEvoy, G.K. (ed.). American Hospital Formulary Service - Drug Information 92. Bethesda, MD: American Society of Hospital Pharmacists, Inc., 1992 (Plus Supplements 1992)., p.

2125]
Synthetic pyrethroids are generally metabolized in mammals through ester hydrolysis, oxidation, and conjugation, and there is no tendency to accumulate in tissues. In the environment, synthetic pyrethroids are fairly rapidly degraded in soil and in plants. Ester hydrolysis and oxidation at various sites on the molecule are the major degradation processes. /Synthetic pyrethroids/ **PEER REVIEWED** [WHO; Environmental Health Criteria 99: Cyhalothrin p.13 (1990)]

Action Mechanism (ACTN):
The synthetic pyrethroids delay closure of the sodium channel, resulting in a sodium tail current that is characterized by a slow influx of sodium during the end of depolarization. Apparently the pyrethroid molecule holds the activation gate in the open position. Pyrethroids with an alpha-cyano group (e.g., fenvalerate) produce more prolonged sodium tail currents than do other pyrethroids (e.g., permethrin, bioresmethrin). The former group of pyrethroids causes more cutaneous sensations than the latter. /Synthetic pyrethroids/ **PEER REVIEWED** [Ellenhorn, M.J. and D.G. Barceloux. Medical Toxicology - Diagnosis and Treatment of Human Poisoning. New York, NY: Elsevier Science Publishing Co., Inc. 1988., p. 1081]
Interaction with sodium channels is not the only mechanism of action proposed for the pyrethroids. Their effects on the central nervous system have led various workers to suggest actions via antagonism of gamma-aminobutyric acid (GABA)-mediated inhibition, modulation of nicotinic cholinergic transmission, enhancement of noradrenaline release, or actions on calcium ions. Since neurotransmitter specific pharmacological agents offer only poor or partial protection against poisoning, it is unlikely that one of these effects represents the primary mechanism of action of the pyrethroids and most neurotransmitter release is secondary to increased sodium entry. /Pyrethroids/ **PEER REVIEWED** [Hayes, W.J., Jr., E.R. Laws, Jr., (eds.). Handbook of Pesticide Toxicology. Volume 2. Classes of Pesticides. New York, NY: Academic Press, Inc., 1991., p. 588]
The symptoms of pyrethrin poisoning follow the typical pattern of nerve poisoning: (1) excitation, (2) convulsions, (3) paralysis, and (4) death. The effects of pyrethrins on the insect nervous system closely resemble those of DDT, but are apparently much less persistent. Regular, rhythmic, and spontaneous nerve discharges have been observed in insect and crustacean nerve-muscle preparations poisoned with pyrethrins. The primary target of pyrethrins seems to be the ganglia of the insect central nervous system although some pyrethrin-poisoning effect can be observed in isolated legs. /Pyrethrins/ **PEER REVIEWED** [Matsumura, F. Toxicology of Insecticides. 2nd ed. New York, NY: Plenum Press, 1985., p. 147]
Electrophysiologically, pyrethrins cause repetitive discharges and conduction block. /Pyrethrins/ **PEER REVIEWED** [Matsumura, F. Toxicology of Insecticides. 2nd ed. New York, NY: Plenum Press, 1985., p. 147]
The interaction of a series of pyrethroid insecticides with the sodium channels in myelinated nerve fibers of the clawed frog, Xenopus laevis, was investigated using the voltage clamp technique. Of 11 pyrethroids, 9 insecticidally active cmpd induced a slowly decaying sodium tail current on termination of a step depolarization, whereas the sodium current during depolarization was hardly affected. /Pyrethroids/ **PEER REVIEWED** [Vijverberg HP M et al; Biochem Biophys Acta 728 (1): 73-82 (1983)]
The biochemical process by which various pyrethroid insecticides alter membrane-bound ATPase activities of the squid nervous system was examined. Of the 5 ATP-hydrolyzing systems tested, only Ca(2+)-stimulated ATPase activities were clearly affected by the pyrethroids. The natural type /I/ pyrethroid, allethrin, primarily inhibits Ca-ATPase activity. /Pyrethroids/ **PEER REVIEWED** [Clark JM, Matsumura F; Pestic Biochem

Physiol 18 (2): 180-90 (1982)]
Mode of action of pyrethrum & related cmpd has been studied more in insects & in other invertebrates than in mammals. This action involves ion transport through the membrane of nerve axons &, at least in invertebrates & lower vertebrates, it exhibits a negative temperature coefficient. In both of these important ways & in many details, the mode of action of pyrethrin & pyrethroids resembles that of DDT. Esterases & mixed-function oxidase system differ in their relative importance for metabolizing different synthetic pyrethroids. The same may be true of the constituents of pyrethrum, depending on strain, species, & other factors. /Pyrethrins and pyrethroids/ **PEER REVIEWED** [Hayes, Wayland J., Jr. Pesticides Studied in Man. Baltimore/London: Williams and Wilkins, 1982., p. 75]
The interactions of natural pyrethrins and 9 pyrethroids with the nicotinic acetylcholine (ACh) receptor/channel complex of Torpedo electronic organ membranes were studied. None reduced (3)H-ACh binding to the receptor sites, but all inhibited (3)H-labeled perhydrohistrionicotoxin binding to the channel sites in presence of carbamylcholine. Allethrin inhibited binding noncompetitively, but (3)H-labeled imipramine binding competitively, suggesting that allethrin binds to the receptor's channel sites that bind imipramine. The pyrethroids were divided into 2 types according to their action: type A, which included allethrin, was more potent in inhibiting (3)H-H12-HTX binding and acted more rapidly. Type B, which included permethrin, was less potent and their potency increased slowly with time. The high affinities that several pyrethroids have for this nicotinic ACh receptor suggest that pyrethroids may have a synaptic site of action in addition to their well known effects on the axonal channels. /Pyrethrins and Pyrethroids/ **PEER REVIEWED** [Abbassy MA et al; Pestic Biochem Physiol 19 (3): 299-308 (1983)]
... Pyrethroid esters /containing the alpha-cyano substituent/ produce an even longer delay /than those lacking the substituent/ in sodium channel inactivation, leading to a persistent depolarization of the nerve membrane without repetitive discharge, a reduction in the amplitude of the action potential, and an eventual failure of axonal conduction and a blockade of impulses. /Pyrethroid esters containing the alpha-cyano substituent/ **PEER REVIEWED** [Amdur, M.O., J. Doull, C.D. Klaasen (eds). Casarett and Doull's Toxicology. 4th ed. New York, NY: Pergamon Press, 1991., p. 595]
The primary target site of pyrethroid insecticides in the vertebrate nervous system is the sodium channel in the nerve membrane. Pyrethroids without an alpha-cyano group (allethrin, d-phenothrin, permethrin, and cismethrin) cause a moderate prolongation of the transient increase in sodium permeability of the nerve membrane during excitation. This results in relatively short trains of repetitive nerve impulses in sense organs, sensory (afferent) nerve fibers, and, in effect, nerve terminals. On the other hand, the alpha-cyano pyrethroids cause a long lasting prolongation of the transient increase in sodium permeability of the nerve membrane during excitation. This results in long-lasting trains of repetitive impulses in sense organs and a frequency-dependent depression of the nerve impulse in nerve fibers. The difference in effects between permethrin and cypermethrin, which have identical molecular structures except for the presence of an alpha-cyano group on the phenoxybenzyl alcohol, indicates that it is this alpha-cyano group that is responsible for the long-lasting prolongation of the sodium permeability. Since the mechanisms responsible for nerve impulse generation and conduction are basically the same throughout the entire nervous system, pyrethroids may also induce repetitive activity in various parts of the brain. The difference in symptoms of poisoning by alpha-cyano pyrethroids, compared with the classical pyrethroids, is not necessarily due to an exclusive central site of action. It may be related to the long-lasting repetitive activity in sense organs and possibly in other parts of the nervous system, which, in a more advance state of poisoning, may be accompanied by a

frequency-dependent depression of the nervous impulse. /Synthetic pyrethroids/ **PEER REVIEWED** [WHO; Environmental Health Criteria 99: Cyhalothrin p.89 (1990)]

Pyrethroids also cause pronounced repetitive activity and a prolongation of the transient increase in sodium permeability of the nerve membrane in insects and other invertebrates. Available information indicates that the sodium channel in the nerve membrane is also the most important target site of pyrethroids in the invertebrate nervous system. /Synthetic pyrethroids/ **PEER REVIEWED** [WHO; Environmental Health Criteria 99: Cyhalothrin p.90 (1990)]

In the electrophysiological experiments using giant axons of cray-fish, the Type II pyrethroids retain sodium channels in a modified continuous open state persistently, depolarize the membrane, and block the action potential without causing repetitive firing. /Pyrethroids type II/ **PEER REVIEWED** [WHO; Environmental Health Criteria 99: Cyhalothrin p.87 (1990)]

Diazepam, which facilitates GABA reaction, delayed the onset of action of deltamethrin and fenvalertae, but not permethrin and allethrin, in both the mouse and cockroach. Possible mechanisms of the Type II pyrethroid syndrome include action at the GABA receptor complex or a closely linked class of neuroreceptor. /Pyrethroids type II/ **PEER REVIEWED** [WHO; Environmental Health Criteria 99: Cyhalothrin p.87 (1990)]

Non-systemic insecticide with contact and stomach action. Acts on the nervous system, with rapid knockdown and long residual activity. **PEER REVIEWED** [Tomlin, C.D.S. (ed.). The Pesticide Manual - World Compendium. 10th ed. Surrey, UK: The British Crop Protection Council, 1994., p. 250]

Substance Interaction (INTC):

/Pyrethroid/ detoxification ... important in flies, may be delayed by the addition of synergists ... organophosphates or carbamates ... to guarantee a lethal effect. ... /Pyrethroid/ **PEER REVIEWED** [Buchel KH (ed); Chemistry of Pesticides p.19 (1983)]

Piperonyl butoxide potentiates /insecticidal activity/ of pyrethrins by inhibiting the hydrolytic enzymes responsible for pyrethrins' metabolism in arthropods. When piperonyl butoxide is combined with pyrethrins, the insecticidal activity of the latter drug is increased 2-12 times /Pyrethrins/ **PEER REVIEWED** [McEvoy, G.K. (ed.). American Hospital Formulary Service - Drug Information 92. Bethesda, MD: American Society of Hospital Pharmacists, Inc., 1992 (Plus Supplements 1992)., p. 2125]

At dietary level of 1000 ppm pyrethrins & 10000 ppm piperonyl butoxide ... /enlargement, margination, & cytoplasmic inclusions in liver cells of rats/ were well developed in only 8 days, but ... were not maximal. Changes were proportional to dosage & similar to those produced by DDT. Effects of the 2 ... were additive. /Pyrethrins/ **PEER REVIEWED** [Hayes, Wayland J., Jr. Pesticides Studied in Man. Baltimore/London: Williams and Wilkins, 1982., p. 78]

Pharmacology

Therapeutic Uses (THER):

Pyrethrins with piperonyl butoxide are used for topical treatment of pediculosis (lice infestations). Combinations of pyrethrins with piperonyl butoxide are not effective for treatment of scabies (mite infestations). Although there are no well-controlled comparative studies, many clinicians consider 1% lindane to be pediculicide of choice. However, some clinicians recommend use of pyrethrins with piperonyl butoxide, esp in infants, young children, & pregnant or lactating women ... . If used correctly, 1-3 treatments ... are usually 100% effective ... Oil based (eg, petroleum distillate) combinations ... produce the quickest results. ... For treatment of pediculosis, enough gel, shampoo, or solution ... should be

applied to cover affected hair & adjacent areas ... After 10 min, hair is ... washed thoroughly ... treatment should be repeated after 7-10 days to kill any newly hatched lice. /Pyrethrins/ **PEER REVIEWED** [McEvoy, G.K. (ed.). American Hospital Formulary Service - Drug Information 92. Bethesda, MD: American Society of Hospital Pharmacists, Inc., 1992 (Plus Supplements 1992)., p. 2125]

Environmental Impact

Environmental Fate/Exposure Summary (ENVS):
Cyfluthrin's production and use as an insecticide may result in its release to the environment through a variety of waste streams. Based on an experimental vapor pressure of 2.0X10-9 mm Hg at 25 deg C, cyfluthrin is expected to exist primarily in the particulate phase in the ambient atmosphere. Particulate phase cyfluthrin may be physically removed from the atmosphere by wet and dry deposition. Volatilization from moist soil surfaces is not expected based on an estimated Henry's Law constant of 5.8X10-10 atm-cu m/mol. Cyfluthrin is expected to be immobile in soils based upon a measured Koc value of 33,800. Volatilization from dry soil surfaces is not expected based upon the vapor pressure of this compound. Biodegradation is expected to be an important environmental fate process for this compound. The initial products of cyfluthrin anaerobic biodegradation are 3-(2,2-dichlorovinyl)2,2-dimethylcyclopropancarboxcylic acid and 4-fluoro-3-phenoxybenzoic acid. In water, cyfluthrin is expected to adsorb to sediment or particulate matter based on its experimental Koc value. This compound is not expected to volatilize from water surfaces given its estimated Henry's Law constant. Photolysis is expected to be an important environmental fate process for cyfluthrin. An experimental half-life of 16 hours was measured for cyfluthrin in aqueous solution when irradiated with light at environmentally significant wavelengths. A measured BCF value of 400 was obtained for cypermethrin, an insecticide which is structurally similar to cyfluthrin. The potential for bioconcentration of cyfluthrin in aquatic organisms is considered high based on the measured BCF value of cypermethrin. The general population may be exposed to cyfluthrin through dermal contact with this compound where it is used as an insecticide. (SRC) **PEER REVIEWED**

Artificial Sources (ARTS):
Cyfluthrin's production and use as an insecticide(1) will result in its release to the environment through a variety of waste streams(SRC). **PEER REVIEWED** [(1) Budavari S; The Merck Index - Encyclopedia of Chemicals, Drugs, and Biologicals 12th ed. p 466. Rahway, NJ: Merck and Co Inc (1995)]

Environmental Fate (ENVF):
TERRESTRIAL FATE: Based on a recommended classification scheme(1), an experimental Koc value of 33,800(2), indicates that cyfluthrin will have no mobility in soil(SRC). Volatilization of cyfluthrin is not expected from moist soil surfaces(SRC) given an estimated Henry's Law constant of 5.8X10-10 atm-cu m/mole(SRC), determined from an experimental vapor pressure of 2.0X10-9 mm Hg at 25 deg C(3) and water solubility of 2.0 mg/l at 25 deg C(4). Volatilization from dry soil surfaces is not expected based upon the vapor pressure of this compound(SRC). Biodegradation is expected to be an important fate process for this compound(3,5,SRC). Over 90% biodegradation was observed under anaerobic soil conditions during a 140 day incubation period(5). The initial products of cyfluthrin anaerobic biodegradation are 3-(2,2-dichlorovinyl)2,2-dimethylcyclopropancarboxcylic acid and 4-fluoro-3-phenoxybenzoic acid(5). Photolysis is expected to be an important environmental fate process for cyfluthrin(6,SRC). An experimental half-life of 16 hours was determined for cyfluthrin in aqueous solution when irradiated with light at environmentally significant

wavelengths(6). Approximately 75% photodegradation was observed for cyfluthrin applied to cotton fabrics when irradiated with a lamp designed to simulate 96 hours of natural sunlight(7). **PEER REVIEWED** [(1) Swann RL et al; Res Rev 85: 23 (1983) (2) Kordel W et al; Chemosphere 27:1611-26 (1993)(3) Tomlin C; The Pesticide Manual 10th ed p 248. Cambridge, UK: The Royal Society of Chemistry (1995) (4) Shiu WY et al; Rev Environ Contam Toxicol 116: 15-187 (1990) (5) Smith S et al; Bull Environ Contam Toxicol 55: 142-48 (1995) (6) Jenson-Korte U et al; Sci Tot Environ 62: 335-40 (1987) (7) Hussain M et al; Pestic Sci 28: 345-55 (1990)]

AQUATIC FATE: Based on a recommended classification scheme(1), a measured Koc value of 33,800(2), indicates that cyfluthrin is expected to adsorb to suspended solids and sediment in water(SRC). Cyfluthrin is not expected to volatilize from water surfaces(3,SRC) based on an estimated Henry's Law constant of 5.8X10-10 atm-cu m/mole(SRC), determined from an experimental vapor pressure of 2.0X10-9 mm Hg at 25 deg C(4) and water solubility of 2.0 mg/l at 25 deg C(5). Biodegradation is expected to be an important fate process for this compound(4,6,SRC). Over 90% biodegradation was observed under anaerobic soil conditions during a 140 day incubation period(6). The initial products of cyfluthrin anaerobic biodegradation are 3-(2,2-dichlorovinyl)2,2-dimethylcyclopropancarboxcylic acid and 4-fluoro-3-phenoxybenzoic acid(6). Photolysis is expected to be an important environmental fate process for cyfluthrin(7,SRC). An experimental half-life of 16 hours was measured for cyfluthrin in aqueous solution when irradiated with light at environmentally significant wavelengths(7). A measured BCF value of 400 was obtained for cypermethrin, an insecticide which is structurally similar to cyfluthrin(8). The potential for bioconcentration of cyfluthrin in aquatic organisms is considered high based on the measured BCF value of cypermethrin(9,SRC). **PEER REVIEWED** [(1) Swann RL et al; Res Rev 85: 23 (1983) (2) Kordel W et al; Chemosphere 27:1611-26 (1993) (3) Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington DC: Amer Chem Soc pp. 4-9, 5-4, 5-10, 15-1 to 15-29 (1990) (4) Tomlin C; The Pesticide Manual 10th ed p 248. Cambridge, UK: The Royal Society of Chemistry (1995) (5) Shiu WY et al; Rev Environ Contam Toxicol 116: 15-187 (1990) (6) Smith S et al; Bull Environ Contam Toxicol 55: 142-48 (1995) (7) Jenson-Korte U et al; Sci Tot Environ 62: 335-40 (1987) (8) Freitag D et al; Chemosphere 14: 1589-1616 (1985) (9) Fruike C et al; Chemosphere 29: 1501-14 (1994)]

ATMOSPHERIC FATE: Based on an experimental vapor pressure of 2.0X10-9 mm Hg at 25 deg C(1), cyfluthrin is expected to exist primarily in the particulate phase in the ambient atmosphere. Particulate phase cyfluthrin may be physically removed from the atmosphere by wet and dry deposition(SRC). **PEER REVIEWED** [(1) Tomlin C; The Pesticide Manual 10th ed p 248. Cambridge, UK: The Royal Society of Chemistry (1995)]

Biodegradation (BIOD):

Biodegradation is expected to be an important environmental fate process for cyfluthrin(1,SRC). Over 90% biodegradation was observed under anaerobic soil conditions during a 140 day incubation period(1). The initial products of cyfluthrin anaerobic biodegradation are 3-(2,2-dichlorovinyl)2,2-dimethylcyclopropancarboxcylic acid and 4-fluoro-3-phenoxybenzoic acid(1). **PEER REVIEWED** [(1) Smith S et al; Bull Environ Contam Toxicol 55: 142-48 (1995)]

Abiotic Degradation (ABIO):

Aqueous hydrolysis is not expected to be an important environmental fate process for cyfluthrin(SRC). A base-catalyzed second order rate constant of 6.1X10-3 L/mol-sec(SRC) was estimated using a structure estimation method(1); this corresponds to half-lives of 35.9 and 3.5 years at pH values of 7 and 8, respectively(1,SRC). Photolysis is expected to be an important environmental fate process for cyfluthrin(2,SRC). An

experimental half-life of 16 hours was measured for cyfluthrin in aqueous solution when irradiated with light at environmentally significant wavelengths (> 290 nm)(2). Approximately 75% photodegradation was observed for cylfluthrin applied to cotton fabrics when irradiated with a lamp designed to simulate 96 hours of natural sunlight(3). **PEER REVIEWED** [(1) Mill T et al; Environmental Fate and Exposure Studies. Development of a PC-SAR for Hydrolysis: Esters, Alkyl Halides and Epoxides. EPA Contract NO. 68-02-4254, Menlo Park, CA: SRI International (1987) (2) Jenson-Korte U et al; Sci Tot Environ 62: 335-40 (1987) (3) Hussain M et al; Pestic Sci 28: 345-55 (1990)]

Bioconcentration (CBIO):
A measured BCF value of 400 was obtained for cypermethrin, an insecticide which is structurally similar to cyfluthrin(1). The potential for bioconcentration of cyfluthrin in aquatic organisms is considered high based on the measured BCF value of cypermethrin(2,SRC). **PEER REVIEWED** [(1) Freitag D et al; Chemosphere 14: 1589-1616 (1985) (2) Franke C et al; Chemosphere 29: 1501-14 (1994)]

Soil Adsorption/Mobility (KOC):
The experimental Koc value of cyfluthrin is 33,800 under non-specified soil conditions(1). According to a recommended classification scheme(2), this experimental Koc value suggests that cyfluthrin will have no mobility in soil(SRC). **PEER REVIEWED** [(1) Kordel W et al; Chemosphere 27: 1611-26 (1993) (2) Swann RL et al; Res Rev 85: 23 (1983)]

Volitization from Water/Soil (VWS):
The Henry's Law constant for cyfluthrin is estimated as 5.8X10-10 atm-cu m/mole(SRC) from its experimental value for vapor pressure, 2.0X10-9 mm Hg(1), and experimental water solubility, 2.0 mg/l(2). This value indicates that cyfluthrin will not volatilize from water surfaces(3,SRC). Cyfluthrin's Henry's Law constant and vapor pressure indicate that volatilization from moist and dry soil surfaces are not important environmental fate processes(SRC). **PEER REVIEWED** [(1) Tomlin C; The Pesticide Manual 10th ed p 248 Cambridge, UK: The Royal Society of Chemistry (1995) (2) Shiu WY et al; Rev Environ Contam Toxicol 116: 15-187 (1990) (3) Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington DC: Amer Chem Soc pp. 15-1 to 15-29 (1990)]

Probable Routes of Human Exposure (RTEX):
Occupational exposure to cyfluthrin may occur through dermal contact at facilities where this compound is produced or used. The general population may be exposed to cyfluthrin through dermal contact with this compound. (SRC) **PEER REVIEWED**

Standards and Regulations

Ingestion Level (INGL):
FAO/WHO ADI: 0.02 mg/kg **PEER REVIEWED** [FAO/WHO; Pesticide Residues in Food - 1992. Evaluations Part 1 - Residues p.869 Plant Prod Protection Paper 118 (1992)]

Allowable Tolerances (ATOL):
Tolerances are established for residues of the insecticide cyfluthrin (cyano(4-fluoro-3-phenoxyphenyl)methyl 3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate ... in or on the following raw agricultural commodities: alfalfa, forage 5.00 ppm (expiration date 11/15/97); alfalfa, hay 10.00 ppm (expiration date 11/15/97); carrots 0.20 ppm (expiration date 11/15/97); cattle, fat 1.00 ppm (expiration date 11/15/97); cattle, meat 0.40 ppm (expiration date 11/15/97); cattle mbyp 0.40 ppm (expiration date 11/15/97); cottonseed 1.0 ppm (expiration date

11/15/97); eggs 0.01 ppm (expiration date 11/15/97); goats, fat 1.00 ppm (expiration date 11/15/97); goats, meat 0.40 ppm (expiration date 11/15/97); goats, mbyp 0.40 ppm (expiration 11/15/97); hogs, fat 1.00 ppm (expiration date 11/15/97); hogs, meat 0.40 ppm (expiration 11/15/97); hogs, mbyp 0.40 ppm (expiration date 11/15/97); hops, fresh 4.0 ppm (expiration date: none); horses, fat 1.00 ppm (expiration date 11/15/97); horses, meat 0.40 ppm (expiration date 11/15/97); horses, mbyp 0.40 ppm (expiration date 11/15/97); milkfat (reflecting 0.08 ppm in whole milk) 2.50 ppm (expiration date 11/15/97); peppers 0.50 ppm (expiration date 11/15/97); poultry, fat 0.01 ppm (expiration date 11/15/97); poultry, meat 0.01 ppm (expiration date 11/15/97); poultry, mbyp 0.01 ppm (expiration date 11/15/97); radishes 1.00 ppm (expiration date 11/15/97); sheep, fat 1.00 ppm (expiration date 11/15/97); sheep, meat 0.40 ppm (expiration date 11/15/97); sheep, mbyp 0.40 ppm (expiration date 11/15/97); sugarcane 0.05 ppm (expiration date 11/15/97); sunflower, forage 1.00 ppm (expiration date 11/15/97); sunflower, seed 0.02 ppm (expiration date 11/15/97); and tomato 0.20 ppm (expiration date 11/15/97). **PEER REVIEWED** [40 CFR 180.436(a) (7/1/96)]

Time-limited tolerances are established for residues of the insecticide cyfluthrin (cyano(4-fluoro-3-phenoxyphenyl)methyl 3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate ... in or on the following raw agricultural commodities: corn, forage and fodder, field and pop 0.01 ppm (expiration date 7/5/99); corn, grain, field and pop 0.01 ppm (expiration date 7/5/99); corn, sweet, (K+CWHR) 0.05 ppm (expiration date 7/5/99); corn, sweet, fodder 15.00 ppm (expiration date 7/5/99); and corn, sweet, forage 30.00 ppm (expiration date 7/5/99). **PEER REVIEWED** [40 CFR 180.436(b) (7/1/96)]

A time-limited tolerance, to expire on november 15, 1997, is established for residues of the insecticide cyfluthrin (cyano(4-fluoro-3-phenoxyphenyl)methyl 3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate ... in or on the following food commodities: cottonseed oil 2.0 ppm; tomato, concentrated products 0.5 ppm. **PEER REVIEWED** [40 CFR 185.1250(a) (7/1/96)]

A tolerance of 0.05 ppm is established for residues of the insecticide cyfluthrin (cyano(4-fluoro-3-phenoxyphenyl)methyl 3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate ... in food commodities exposed to the insecticide during treatment of food-handling establishments where food and food products are held, processed, prepared, or served. **PEER REVIEWED** [40 CFR 185.1250(c) (7/1/96)]

A tolerance of 20.0 ppm is established for residues of the insecticide cyfluthrin (cyano(4-fluoro-3-phenoxyphenyl)methyl 3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate) ... in or on dried hops resulting from application of the insecticide to hops. **PEER REVIEWED** [40 CFR 185.1250(d) (7/1/96)]

FIFRA Requirements (FIFRA):

Tolerances are established for residues of the insecticide cyfluthrin (cyano(4-fluoro-3-phenoxyphenyl)methyl 3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate ... in or on the following raw agricultural commodities: alfalfa, forage; alfalfa, hay; carrots; cattle, fat; cattle, meat; cattle mbyp; cottonseed; eggs; goats, fat; goats, meat; goats, mbyp; hogs, fat; hogs, meat; hogs, mbyp; hops, fresh; horses, fat; horses, meat; horses, mbyp; milkfat (reflecting 0.08 ppm in whole milk); peppers; poultry, fat; poultry, meat; poultry, mbyp; radishes; sheep, fat; sheep, meat; sheep, mbyp; sugarcane; sunflower, forage; sunflower, seed; and tomato. **PEER REVIEWED** [40 CFR 180.436(a) (7/1/96)]

Time-limited tolerances are established for residues of the insecticide cyfluthrin (cyano(4-fluoro-3-phenoxyphenyl)methyl 3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate ... in or on the following raw agricultural commodities: corn, forage and fodder, field and pop; corn, grain, field and pop; corn, sweet, (K+CWHR); corn, sweet, fodder; and

corn, sweet, forage. **PEER REVIEWED** [40 CFR 180.436(b) (7/1/96)]
A time-limited tolerance, to expire on november 15, 1997, is established for residues of the insecticide cyfluthrin (cyano(4-fluoro-3-phenoxyphenyl)methyl 3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate ... in or on the following food commodities: cottonseed oil; tomato, concentrated products. **PEER REVIEWED** [40 CFR 185.1250(a) (7/1/96)]
A tolerance ... is established for residues of the insecticide cyfluthrin (cyano(4-fluoro-3-phenoxyphenyl)methyl 3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate ... in food commodities exposed to the insecticide during treatment of food-handling establishments where food and food products are held, processed, prepared, or served. **PEER REVIEWED** [40 CFR 185.1250(c) (7/1/96)]
A tolerance is established for residues of the insecticide cyfluthrin (cyano(4-fluoro-3-phenoxyphenyl)methyl 3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate) ... in or on dried hops resulting from application of the insecticide to hops. **PEER REVIEWED** [40 CFR 185.1250(d) (7/1/96)]

Monitoring and Analysis Methods

Analytic Laboratory Method (ALAB):
Pyrethrins ... in pesticide formulations are analyzed using gas chromatography equipped with flame ionization detection. Average recovery is 98% with a precision of 0.0044-0.011. /Pyrethrins/ **PEER REVIEWED** [Association of Official Analytical Chemists. Official Methods of Analysis. 15th ed. and Supplements. Washington, DC: Association of Analytical Chemists, 1990, p. V1 172]
... Liquid chromatography method has been developed to quantitate pyrethrins in pesticide formulations. ... Detection was monitored at 240 nm. ... Percent coefficients of variation ranged from 1.39 to 9.68 with the majority less than 5.00. ... /Pyrethrins/ **PEER REVIEWED** [Bushway RJ; J Assoc Off Anal Chem 68 (6): 1134-6 (1985)]
Pyrethrins were detected in soils by gas chromatography after extraction with hexane. /Pyrethrins/ **PEER REVIEWED** [Siltanen H et al; Ryrethrum Post 14 (3): 65-7 (1978)]
Low level pyrethrin formulations are extracted with tetrahydrofuran and determined via capillary gas chromatography with electron capture detection. ... Analysis of 5 formulations gave an average standard deviation of 3.3%. /Pyrethrins/ **PEER REVIEWED** [Stringham RW, Schutz RP; J Assoc Off Anal Chem 68 (6): 1137-9 (1985)]

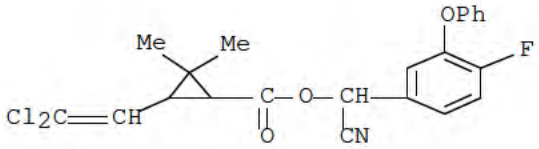
Additional References

Special Report (RPTS):
Purdue University; National Pesticide Information Retrieval System, Cyfluthrin Fact Sheet No. 164 (1987)

Registry of Toxic Effects of Chemical Substances (RTECS). This National Institute of Occupational Safety and Health (NIOSH) file is a compendium of toxicity data extracted from the scientific literature. File Last Reloaded: DECEMBER 2005

This file contains CAS Registry Numbers for easy and accurate substance identification.

L3 ANSWER 1 of 1 RTECS COPYRIGHT 2006 DOC on STN
CAS Registry Number (RN): 68359-37-5RTECS
Other Registry Numbers: 85782-82-7
RTECS Number (RTN): GZ1253000
Molecular Formula (MF): C22 H18 Cl2 F N O3
Formula Weight (FW): 434.31
Chemical Name (CN): Cyclopropanecarboxylic acid, 2-(2,2-dichlorovinyl)-3,3-dimethyl-, ester with (4-fluoro-3-phenoxyphenyl)hydroxyacetonitrile;
BAY FCR 1272; BAY-VI 1704; Baythroid; Baythroid H; Baythroid technical; Bulldock; Cyfluthrin; Cyfoxylate; Eulan SP; FCR 1272; FCR 3545; Responsar; Solfac; Tempo 2
Class Identifier (CI): Agricultural Chemical
Wiswesser Notation (WLN): L3TJ A1 A1 B1UYGG CVOYCN&R DF CUR
Entry/Update Date (DATE): Aug 2005
Character Count: 7864



REPRODUCTIVE EFFECTS DATA (REP):

Effect EFF	Route RTE	Organism ORGN	Dose DOSE	Duration DUR	Source SO
T75;T76;T81	inhalation	mammal (species unspecified)	TCLo 7.5 mg/kg	multigeneratio ns	FEREAC 66,27469,2001
T75;T81	unreported	mammal (species unspecified)	TDLo 7.5 mg/kg	multigeneratio ns	FEREAC 64,35060,1999
T09;T19;T77	oral	rat	TDLo 9 mg/kg	multigeneratio ns	FEREAC 69,4143,2004

REPRODUCTIVE EFFECTS REFERENCES:
FEREAC Federal Register (U.S. Government Printing Office, Supt. of Documents, Washington, DC 20402) V.1- 1936-

TOXICITY DATA (TOX):

Effect EFF	Route RTE	Organism ORGN	Dose DOSE	Duration DUR	Source SO
	oral	rat	LD50 900 mg/kg		FMCHA2 -,C39,1991

	inhalation	rat	LC50 469 g/m**3	4H	PEMNDP 9,198,1991
	skin	rat	LD50 >5 g/kg		PEMNDP 9,198,1991
	oral	mouse	LD50 300 mg/kg		85KYAH 11,432,1989
	oral	dog	LD50 500 mg/kg		PEMNDP 9,198,1991
	oral	chicken	LD50 5 g/kg		PEMNDP 9,198,1991
	oral	quail	LD50 >5 g/kg		PEMNDP 9,198,1991
F05;F15;F23	oral	domestic animal (goat, sheep)	LD50 1 g/kg		NTIS** OTS0555484
	oral	bird (domestic or lab)	LD50 250 mg/kg		PEMNDP 9,198,1991
	oral	mammal (species unspecified)	LD50 16 mg/kg		FEREAC 64,35059,1999
	skin	mammal (species unspecified)	LD50 5000 mg/kg		FEREAC 64,35059,1999
	inhalation	mammal (species unspecified)	LC50 0.468 g/m**3		FEREAC 64,35059,1999
F13	oral	chicken	TDLo 2500 mg/kg		FEREAC 67,60976,2002
C18	oral	chicken	LD50 5000 mg/kg		FEREAC 67,60976,2002

TOXICITY DATA REFERENCES:
FMCHM2 Farm Chemicals Handbook (Meister Pub., 37841 Euclid Ave., Willoughy, OH 44094)
PEMNDP Pesticide Manual (The British Crop Protection Council, 20 Bridport Rd., Thornton Heath CR4 7QG, UK) V.1- 1968-
85KYAH "Merck Index; an Encyclopedia of Chemicals, Drugs, and Biologicals" 11th ed., Rahway, NJ 07065, Merck & Co., Inc. 1989
NTIS** National Technical Information Service (Springfield, VA 22161) Formerly U.S. Clearinghouse for Scientific & Technical Information.
FEREAC Federal Register (U.S. Government Printing Office, Supt. of Documents, Washington, DC 20402) V.1- 1936-

OTHER MULTIPLE DOSE DATA (OMUL):

Effect EFF	Route RTE	Organism ORGN	Dose DOSE	Duration DUR	Source SO
L30;P30;Y09	oral	rat	TDLo 25 mg/kg	5D-I	TOVEFN (2),23,200 0
N22;P08;U06	oral	chicken	TDLo 6.9993E+04 ug/kg	21D-I	JJATDK 7,367,1987
Y61	intraperitoneal	rat	TDLo 84 mg/kg	6D-I	TOXID9 72,306,200 3
R11	skin	rat	TDLo 7896 mg/kg	21D-I	FEREAC 67,60976,2 002
U01	inhalation	rat	TCLo 14.4 mg/kg	90D-I	FEREAC 67,60976,2 002
P30;U28	inhalation	rat	TCLo 44.8 mg/kg	4W-I	FEREAC 67,60976,2 002
F17	inhalation	mouse	TCLo 43.47 mg/kg	7D-I	FEREAC 67,60976,2 002
F19;K12;K13	oral	dog	TDLo 2520 mg/kg	24W-I	FEREAC 67,60976,2 002
L70;N72;U01	oral	rat	TDLo 1120 mg/kg	28D-C	FEREAC 69,4143,20 04
F19;U01;Z01	oral	rat	TDLo 3375 mg/kg	90D-I	FEREAC 69,4143,20 04
F19;K30	oral	dog	TDLo 2745 mg/kg	0.5Y-I	FEREAC 69,4143,20 04
F19;P28	oral	dog	TDLo 4015 mg/kg	1Y-I	FEREAC 69,4143,20 04
U01	oral	rat	TDLo 8468 mg/kg	2Y-I	FEREAC 69,4143,20 04
D45;U01	oral	mouse	TDLo 8.3804E+04 mg/kg	2Y-I	FEREAC 69,4143,20 04

F15;L30;U01	oral	mouse	TDLo 2.26081E+05 mg/kg	2Y-I	FEREAC 69,4143,2004

OTHER MULTIPLE DOSE REFERENCES:
TOVEFN Toksikologicheskii Vestnik (18-20 Vadkovskii per. Moscow, 101479, Russia) History Unknown
JJATDK JAT, Journal of Applied Toxicology (John Wiley & Sons Ltd., Baffins Lane, Chichester, W. Sussex PO19 1UD, UK) V.1- 1981-
TOXID9 Toxicologist (Soc. of Toxicology, Inc., 475 Wolf Ledge Parkway, Akron, OH 44311) V.1- 1981-
FEREAC Federal Register (U.S. Government Printing Office, Supt. of Documents, Washington, DC 20402) V.1- 1936-

STANDARD AND REGULATIONS (SREG):
EPA FIFRA 1998 STATUS OF PESTICIDES: Active registration RBREV* -,362,1998

STANDARDS AND REGULATIONS REFERENCES:
RBREV* Status of Pesticides in Registration, Reregistration, and Special Review (Rainbow Report), Special Review and Reregistration Division, Office of Pesticide Programs U S. Environmental Protection Agency, 401 M. Street, S.W., Washington, D.C. 20460, Spring 1998

FEDERAL AGENCY STATUS (ASTA):
On EPA IRIS database
EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, JANUARY 2001

The MSDS-OHS file includes the Material Safety Data Sheets, Summary Sheets, and Label Data for pure substances and mixtures.

ACS and CAS make no representation concerning the content and make no warranties of any kind regarding the accuracy or completeness of the database and specifically disclaim any liability for the content and information contained therein. Customer acknowledges that the database is the property of MDL Information Systems. For further notice of terms, conditions and restrictions, please type HELP USAGETERMS.

This file contains CAS Registry Numbers for easy and accurate substance identification.

L5 ANSWER 1 OF 1 MSDS-OHS COPYRIGHT 2006 MDL on STN

OHSN OHS72630 MSDS-OHS

SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MDL INFORMATION SYSTEMS, INC.
1281 Murfreesboro Road, Suite 300
Nashville, TN 37217-2423
1-615-366-2000

EMERGENCY TELEPHONE NUMBER:
1-800-424-9300 (NORTH AMERICA)
1-703-527-3887 (INTERNATIONAL)

SUBSTANCE: CYFLUTHRIN

TRADE NAMES/SYNONYMS:
CYCLOPROPANECARBOXYLIC ACID, 3-(2,2-DICHLOROETHENYL)-2,2-DIMETHYL-, CYANO(4-FLUORO-3-PHENOXYPHENYL)METHYL ESTER; CYANO(4-FLUORO-3-PHENOXYPHENYL)METHYL-3-(2,2-DICHLOROETHENYL)2,2-DIMETHYLCYCLOPROPANECARBOXYLATE; (RS)-ALPHA-CYANO-4-FLUORO-3-PHENOXYBENZYL (1RS,3RS,1RS,3SR)-3- (2,2-DICHLOROVINYL)-2,2-DIMETHYLCYCLOPROPANECARBOXYLATE; (RS)-ALPHA-CYANO-4-FLUORO-3-PHENOXYBENZYL(1RS)-CIS-TRANS-3-(2,2-DICHLOROVINYL-2,2-DIMETHYLCYCLOPROPANECARBOXYLATE; BAY-FCR 1272; BAYTHROID; FCR 1272; C22H18CL2FNO3; OHS72630; RTECS GZ1253000

CHEMICAL FAMILY: pyrethroids

CREATION DATE: May 03 1989
REVISION DATE: Dec 08 2005

SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: CYFLUTHRIN
CAS NUMBER: 68359-37-5
EC NUMBER (EINECS): 269-855-7
EC INDEX NUMBER: 607-253-00-1
PERCENTAGE: 100.0

SECTION 3 HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=1 REACTIVITY=0

EMERGENCY OVERVIEW:
COLOR: yellow
PHYSICAL FORM: paste
MAJOR HEALTH HAZARDS: eye irritation

POTENTIAL HEALTH EFFECTS:
INHALATION:
  SHORT TERM EXPOSURE: convulsions
  LONG TERM EXPOSURE: no information on significant adverse effects
SKIN CONTACT:
  SHORT TERM EXPOSURE: irritation, itching
  LONG TERM EXPOSURE: no information on significant adverse effects
EYE CONTACT:
  SHORT TERM EXPOSURE: irritation, tearing
  LONG TERM EXPOSURE: no information on significant adverse effects
INGESTION:
  SHORT TERM EXPOSURE: convulsions
  LONG TERM EXPOSURE: vomiting, diarrhea

CARCINOGEN STATUS:
OSHA: No
NTP: No
IARC: No

SECTION 4 FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.

SKIN CONTACT: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: Get medical attention immediately.

NOTE TO PHYSICIAN: For ingestion, consider gastric lavage and catharsis. Consider oxygen.

SECTION 5 FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Slight fire hazard.

EXTINGUISHING MEDIA: regular dry chemical, carbon dioxide, water, regular foam

Large fires: Use regular foam or flood with fine water spray.

FIRE FIGHTING: Move container from fire area if it can be done without risk. Do not scatter spilled material with high-pressure water streams. Dike for later disposal. Use extinguishing agents appropriate for surrounding fire. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas.

SECTION 6 ACCIDENTAL RELEASE MEASURES

SOIL RELEASE:
Dig holding area such as lagoon, pond or pit for containment. Dike for later disposal. Absorb with sand or other non-combustible material.

WATER RELEASE:
Absorb with activated carbon. Collect spilled material using mechanical equipment.

OCCUPATIONAL RELEASE:
Collect spilled material in appropriate container for disposal. Keep out of water supplies and sewers. Keep unnecessary people away, isolate hazard area and deny entry. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

SECTION 7 HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Keep separated from incompatible substances.

SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:
CYFLUTHRIN:
0.01 mg/m3 DFG MAK (inhalable fraction) (peak limitation category - I, with excursion factor of 2)

VENTILATION: Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: Under conditions of frequent use or heavy exposure, respiratory protection may be needed. Respiratory protection is ranked in order from minimum to maximum. Consider warning properties before use.
Any chemical cartridge respirator with organic vapor cartridge(s) and dust and mist filter(s).
Any chemical cartridge respirator with organic vapor cartridge(s) and high-efficiency particulate filter(s).
Any air-purifying respirator with a full facepiece, an organic vapor canister and a dust, mist, and fume filter.
Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter.
For Unknown Concentrations or Immediately Dangerous to Life or Health -
Any supplied-air respirator with full facepiece and operated in a

pressure-demand or other positive-pressure mode in combination with a separate escape supply.
Any self-contained breathing apparatus with a full facepiece.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: solid
COLOR: yellow
PHYSICAL FORM: paste
ODOR: Not available
MOLECULAR WEIGHT: 434.31
MOLECULAR FORMULA: C22-H18-CL2-F-N-O3
BOILING POINT: Not applicable
MELTING POINT: 140 F (60 C)
VAPOR PRESSURE: <0.0000075 mmHg @ 20 C
VAPOR DENSITY: Not applicable
SPECIFIC GRAVITY (water=1): 1.27-1.28
WATER SOLUBILITY: 20 ppm
PH: Not applicable
VOLATILITY: Not applicable
ODOR THRESHOLD: Not available
EVAPORATION RATE: Not applicable
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available
SOLVENT SOLUBILITY:
Soluble: dichloromethane, toluene
Moderately Soluble: hexane, isopropanol

SECTION 10 STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.

CONDITIONS TO AVOID: Avoid heat, flames, sparks and other sources of ignition.
Avoid contact with incompatible materials.

INCOMPATIBILITIES: oxidizing materials

CYFLUTHRIN:
OXIDIZERS: Fire and explosion hazard.

HAZARDOUS DECOMPOSITION:
Thermal decomposition products: oxides of nitrogen, carbon, halogenated compounds

POLYMERIZATION: Will not polymerize.

SECTION 11 TOXICOLOGICAL INFORMATION

CYFLUTHRIN:
TOXICITY DATA:
590 mg/kg oral-rat LD50; 900 mg/kg oral-rat LD50; 469 gm/m3/4 hour(s) inhalation-rat LC50; >5 gm/kg skin-rat LD50; 300 mg/kg oral-mouse LD50; 500 mg/kg oral-dog LD50; 5 gm/kg oral-chicken LD50; >5 gm/kg oral-quail LD50; 1 gm/kg oral-domestic animal LD50; 250 mg/kg oral-bird LD50; 16.2 mg/kg

oral-mammal LD50; 5000 mg/kg skin-mammal LD50; 0.468 gm/m3 inhalation-mammal LC50; 2500 mg/kg oral-chicken TDLo; 5000 mg/kg oral-chicken LD50; 25 mg/kg/5 day(s) intermittent oral-rat TDLo; 69993 ug/kg/21 day(s) intermittent oral-chicken TDLo; 84 mg/kg/6 day(s) intermittent intraperitoneal-rat TDLo; 7896 mg/kg/21 day(s) intermittent skin-rat TDLo; 14.4 mg/kg/90 day(s) intermittent inhalation-rat TCLo; 44.8 mg/kg/4 week(s) intermittent inhalation-rat TCLo; 43.47 mg/kg/7 day(s) intermittent inhalation-mouse TCLo; 2520 mg/kg/24 week(s) intermittent oral-dog TDLo; 1120 mg/kg/28 day(s) continuous oral-rat TDLo; 3375 mg/kg/90 day(s) intermittent oral-rat TDLo; 2745 mg/kg/0.5 year(s) intermittent oral-dog TDLo; 4015 mg/kg/1 year(s) intermittent oral-dog TDLo; 8468 mg/kg/2 year(s) intermittent oral-rat TDLo; 83804 mg/kg/2 year(s) intermittent oral-mouse TDLo; 226081 mg/kg/2 year(s) intermittent oral-mouse TDLo

LOCAL EFFECTS:
Irritant: eye

ACUTE TOXICITY LEVEL:
Moderately Toxic: ingestion
Slightly Toxic: dermal absorption
Relatively Non-toxic: inhalation

REPRODUCTIVE EFFECTS DATA:
7.5 mg/kg inhalation-mammal TCLo multigenerations; 7.5 mg/kg unreported-mammal TDLo multigenerations; 9 mg/kg oral-rat TDLo multigenerations

HEALTH EFFECTS:

INHALATION:
CYFLUTHRIN: In a nose-only toxicity study in rats a decrease in body and thymus weights, hypothermia, reduction in leukocytes counts and low serum protein was seen at the 6.04 mg/m3 dose. Developmental toxicity studies in rats at 2.55 mg/m3 caused reduced fetal and placental weight, reduced ossification in the phalanges, metacarpals and vertebrae. See information on pyrethroid.

ACUTE EXPOSURE:
PYRETHROIDS: Heavy exposure to a mist of some pyrethroids has produced hypersensitivity, ataxia, and urinary incontinence. Convulsions may also be possible.

CHRONIC EXPOSURE:
PYRETHROIDS: Animals exposed to aerosols of some pyrethroids for 3-4 hours/day for up to 4 weeks did not exhibit any significant compound related findings.

SKIN CONTACT:
CYFLUTHRIN: May cause irritation. Animal studies indicate skin absorption may occur. A 21-day study in rats at 1077 mg/kg/day resulted in decreased food consumption, red nasal discharge and urine staining. See information on pyrethroids.

ACUTE EXPOSURE:
PYRETHROIDS: Based on animal and human studies and human experiences with some pyrethroids, primary irritation is unlikely. Cutaneous paresthesias may occur including numbness, itching, burning, tingling and warmth without signs of irritation. These effects may be delayed for 30 minutes or more and last less than 24 hours.

CHRONIC EXPOSURE:
PYRETHROIDS: Tests with some pyrethroids on humans and animals indicate sensitization is unlikely.

EYE CONTACT:

CYFLUTHRIN: This material was irritating to rabbit eyes. See information on pyrethroids.

ACUTE EXPOSURE:
PYRETHROIDS: Massive instillation of some pyrethroids into rabbit eyes produced only a slight, transient congestion of the conjunctiva or lacrimation.

CHRONIC EXPOSURE:
PYRETHROIDS: No data available.

INGESTION:
CYFLUTHRIN: A 12-month feeding study in dogs at 16 mg/kg/day produced slight ataxia, increased vomiting, diarrhea and decreased body weight. Rats exposed for 24 months to 6.2 mg/kg/day caused decreased body weights and decreased food consumption in males and inflammatory foci in the kidneys of females. See information on pyrethroids.

ACUTE EXPOSURE:
PYRETHROIDS: Some pyrethroids have produced hypersensitivity, nervous irritability, tremors, ataxia, and urinary incontinence in animals. Convulsions may also be possible.

CHRONIC EXPOSURE:
PYRETHROIDS: Increased kidney and liver weights and hepatic histopathological changes were noted in animals chronically fed some pyrethroids.

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY DATA:
FISH TOXICITY: 2.00 ug/L 96 hour(s) LETH (Mortality) Bluegill (Lepomis macrochirus)

INVERTEBRATE TOXICITY: 10 ug/L 96 hour(s) LETH (Mortality) Red swamp crayfish (Procambarus clarki)

SECTION 13 DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations.

SECTION 14 TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION: No classification assigned.

CANADIAN TRANSPORTATION OF DANGEROUS GOODS: No classification assigned.

LAND TRANSPORT ADR: No classification assigned.

LAND TRANSPORT RID: No classification assigned.

AIR TRANSPORT IATA: No classification assigned.

AIR TRANSPORT ICAO: No classification assigned.

MARITIME TRANSPORT IMDG: No classification assigned.

SECTION 15 REGULATORY INFORMATION

U.S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):
PYRETHROIDS: 1 LBS RQ

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30):
Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40):
Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):
ACUTE: Yes
CHRONIC: No
FIRE: No
REACTIVE: No
SUDDEN RELEASE: No

SARA TITLE III SECTION 313 (40 CFR 372.65):
CYFLUTHRIN

OSHA PROCESS SAFETY (29CFR1910.119): Not regulated.

STATE REGULATIONS:
California Proposition 65: Not regulated.

CANADIAN REGULATIONS:
WHMIS CLASSIFICATION: Not determined.

EUROPEAN REGULATIONS:
EC CLASSIFICATION (ASSIGNED):
T+ Very Toxic
T Toxic
N Dangerous for the Environment

EC Classification may be inconsistent with independently-researched data.

DANGER/HAZARD SYMBOL:
T+ Very Toxic
N Dangerous for the Environment

EC RISK AND SAFETY PHRASES:

R 23	Toxic by inhalation.
R 28	Very toxic if swallowed.
R 50/53	Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
S 1/2	Keep locked-up and out of the reach of children.
S 36/37/39	Wear suitable protective clothing, gloves and eye/face protection.
S 45	In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 60	This material and its container must be disposed of as

```
                hazardous waste.
    S 61        Avoid release to the environment. Refer to special
                instructions/Safety data sheets.

GERMAN REGULATIONS:
  WATER HAZARD CLASS (WGK):
    STATE OF CLASSIFICATION: VwVwS
    CLASSIFICATION UNDER HAZARD TO WATER: 3

NATIONAL INVENTORY STATUS:
  U.S. INVENTORY (TSCA): Not listed on inventory.

  TSCA 12(b) EXPORT NOTIFICATION: Not listed.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SECTION 16    OTHER INFORMATION
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MSDS SUMMARY OF CHANGES
  SECTION 11    TOXICOLOGICAL INFORMATION

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L85 ANSWER 3 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2004:327408 TOXCENTER
DOCUMENT NUMBER: CRISP-2003-OH004084-02
TITLE: Pesticide Dose Monitoring in Turf Applicators
AUTHOR(S): HARRIS S A
CORPORATE SOURCE: SAHARRIS@SATURN.VCU.EDU, VIRGINIA COMMONWEALTH UNIVERSITY, 1000 W CARY ST.RM 105 BOX 843050, RICHMOND, VA 23284:VIRGINIA
SUPPORTING ORGANIZATION (SPONSORING AGENCY): U.S. DEPT. OF HEALTH AND HUMAN SERVICES; PUBLIC HEALTH SERVICE; NATIONAL INSTITUTES OF HEALTH, NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
SOURCE: Crisp Data Base National Institutes of Health.
DOCUMENT TYPE: (Research)
FILE SEGMENT: CRISP
LANGUAGE: English
ENTRY DATE: Entered STN: 20041229
Last Updated on STN: 20041229

AB DESCRIPTION: One of the greatest barriers to obtaining useful results in epidemiologic studies is the lack of adequate **exposure** data. The broad, long term objective of the proposed project is to improve the assessment of pesticide **exposures** in epidemiologic studies which will allow for the identification of **health risks** such as **cancer**, which would otherwise not be found using traditional methods of **exposure** assessment. This study has been designed to evaluate total body dose of the cornmonely used pesticides MCPA, niecoprop, dicamba, **cyfluthrin** and imidacloprid (using biological urine monitoring) in professional turf applicators. Previously developed dose prediction models will be validated (mecoprop, dicamba) and adjusted, if necessary to improve dose prediction. The important **exposure** variables or predictor variables which will be effective in predicting total body dose in applicators without the use of biological samples, will be evaluated and this information will be used to determine **exposure** reduction strategies. Prior to the initiation of a full-scale field study, a comprehensive evaluation of the urinary excretion of MCPA, **cyfluthrin** and imidacloprid will be conducted on a group of 10 **workers.** In the second year of the study, a sample of 100 **workers** employed by TruGreen Chemlawn will be selected from approximately 5 different franchises and information concerning the use patterns of pesticides for each individual employee will be obtained. The total amount of each pesticide excreted in the urine will be measured for two consecutive 24 hour periods following a minimum of three work days. This process will be repeated three times: a spring evaluation of herbicide **exposures**; a summer evaluation of insecticide **exposure**; and a fall evaluation of herbicide **exposure.** During each sampling period, information will be obtained from each applicator on spraying practices, hygiene practices, and other variables which may affect their daily **exposure** to herbicides. Current pesticide use reported by the applicators will be compared with actual use data obtained from employer records. A previously developed quantitative **exposure** prediction model that is based on use records and other predictor variables will be validated, and, based on the newly collected data, new models will be developed in order to better predict pesticide **exposures** if deemed necessary. Recommendations, based on questionnaire and modeling data, to reduce **exposure** to these pesticides, will be developed and provided to the participating company and subjects. In the short term, this type of research can be used to reduce pesticide **exposures** by identifying cost-effective controls in both **occupational** and environmental settings and this, in the long term, may help to reduce both **acute** and **chronic health risks.**

L85 ANSWER 4 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2003:158749 TOXCENTER
DOCUMENT NUMBER: CRISP-2002-OH04084-01A1
TITLE: Pesticide Dose Monitoring in Turf Applicators
AUTHOR(S): HARRIS S A
CORPORATE SOURCE: SAHARRIS@SATURN.VCU.EDU, VIRGINIA COMMONWEALTH UNIVERSITY, 1000 W CARY ST.RM 105 BOX 843050, RICHMOND, VA

23284-3050:VIRGINIA
SUPPORTING ORGANIZATION (SPONSORING AGENCY): U.S. DEPT. OF HEALTH AND HUMAN SERVICES; PUBLIC HEALTH SERVICE; NATIONAL INSTITUTES OF HEALTH, NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
SOURCE: Crisp Data Base National Institutes of Health.
DOCUMENT TYPE: (Research)
FILE SEGMENT: CRISP
LANGUAGE: English
ENTRY DATE: Entered STN: 20030708
Last Updated on STN: 20030708

AB DESCRIPTION: One of the greatest barriers to obtaining useful results in epidemiologic studies is the lack of adequate **exposure** data. The broad, long term objective of the proposed project is to improve the assessment of pesticide **exposures** in epidemiologic studies which will allow for the identification of **health risks** such as **cancer**, which would otherwise not be found using traditional methods of **exposure** assessment. This study has been designed to evaluate total body dose of the cornmonly used pesticides MCPA, niecoprop, dicamba, **cyfluthrin** and imidacloprid (using biological urine monitoring) in professional turf applicators. Previously developed dose prediction models will be validated (mecoprop, dicamba) and adjusted if necessary to improve dose prediction. The important **exposure** variables or predictor variables which will be effective in predicting total body dose in applicators without the use of biological samples, will be evaluated and this information will be used to determine **exposure** reduction strategies. Prior to the initiation of a full-scale field study, a comprehensive evaluation of the urinary excretion of MCPA, **cyfluthrin** and imidacloprid will be conducted on a group of 10 **workers**. In the second year of the study, a sample of 100 **workers** employed by TruGreen Chemlawn will be selected from approximately 5 different franchises and information concerning the use patterns of pesticides for each individual employee will be obtained. The total amount of each pesticide excreted in the urine will be measured for two consecutive 24 hour periods following a minimum of three work days. This process will be repeated three times: a spring evaluation of herbicide **exposures**; a summer evaluation of insecticide **exposure**; and a fall evaluation of herbicide **exposure**. During each sampling period, information will be obtained from each applicator on spraying practices, hygiene practices, and other variables which may affect their daily **exposure** to herbicides. Current pesticide use reported by the applicators will be compared with actual use data obtained from employer records. A previously developed quantitative **exposure** prediction model that is based on use records and other predictor variables will be validated, and, based on the newly collected data, new models will be developed in order to better predict pesticide **exposures** if deemed necessary. Recommendations, based on questionnaire and modeling data, to reduce **exposure** to these pesticides, will be developed and provided to the participating company and subjects. In the short term, this type of research can be used to reduce pesticide **exposures** by identifying cost-effective controls in both **occupational** and environmental settings and this, in the long term, may help to reduce both **acute** and **chronic health risks**.

L85 ANSWER 5 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2004:326486 TOXCENTER
DOCUMENT NUMBER: CRISP-2003-HD039428-02
TITLE: Fetal **exposure** to environmental toxins & **infant** outcome
AUTHOR(S): OSTREA E M J R
CORPORATE SOURCE: EOSTREA@MED.WAYNE.EDU, HUTZEL HOSPITAL, 4707 ST ANTOINE BOULEVARD, DETROIT, MI 48201:MICHIGAN
SUPPORTING ORGANIZATION (SPONSORING AGENCY): U.S. DEPT. OF HEALTH AND HUMAN SERVICES; PUBLIC HEALTH SERVICE; NATIONAL INSTITUTES OF HEALTH, NATIONAL INSTITUTE OF CHILD HEALTH AND HUMAN DEVELOPMENT
SOURCE: Crisp Data Base National Institutes of Health.
DOCUMENT TYPE: (Research)
FILE SEGMENT: CRISP

LANGUAGE: English
ENTRY DATE: Entered STN: 20041229
Last Updated on STN: 20041229

AB DESCRIPTION (provided by applicant): The **exposure** of **pregnant women** to environmental toxins is of major concern because of their potential harm on the fetus. However, the detection of fetal **exposure** to environmental toxins still remains a major challenge. We propose that meconium analysis is a promising tool to meet this challenge. Aims: (1) To compare the prevalence and amount of fetal **exposure** to environmental toxins through the analysis of meconium, cord blood and neonatal hair and to determine the degree of agreement among these three methods, (2) to determine the relationship between the prevalence and amount of maternal **exposure** to environmental toxins during **pregnancy**, as determined by serial analyses of maternal hair and blood, to the prevalence and amount of fetal **exposure** to environmental toxins as determined by meconium, cord blood and neonatal hair analyses, and (3) to compare **adverse** immediate (birth weight, length, head circumference, gestational age) and long-term (postnatal growth and neurobehavioral development up to 2 yrs from enrollment) outcomes that are associated with antenatal **exposure** to environmental toxins as determined by maternal blood, maternal hair, meconium, cord blood and neonatal hair analyses. Study design: **Pregnant women** (n=750) will be recruited, at midgestation, from the Outpatient **Clinic** of the Bulacan Provincial Hospital, Philippines and their blood and hair will be obtained at the time of recruitment and at delivery. Umbilical cord blood, meconium and neonatal hair will also be obtained. The samples will be analyzed, by atomic absorption spectrometry, for lead, mercury and cadmium and by gas chromatography/mass spectrometry for the following pesticides and their metabolites: propoxur, transfluthrin, Malathion, DDT, chlorpyrifos, bioallethrin, pretilachlor, lindane, **cyfluthrin** and cypermethrin. Pertinent maternal and **infant** data will be obtained after birth. The **infants** will be subsequently followed up at scheduled intervals for 2 years, to study their physical growth and neurobehavioral development using a battery of tests. Data analysis: The relationship between the presence/amount of environmental toxins in meconium, maternal blood, maternal hair, cord blood or neonatal hair to the immediate and two year outcome in the **infants** will be studied, while controlling for potential confounders. The presence/amount of environmental toxins in maternal blood, hair, cord blood, meconium and neonatal hair will be also evaluated to determine which substrate (s) provide(s) the best index of **exposure** for a given toxin. Expected benefits: Meconium analysis may provide a powerful tool to study the prevalence and degree of fetal **exposure** to environmental toxins and its associated **adverse** effects. This project can also serve as a model for the study of environmental pollutant problems during **pregnancy** at a local, national or global level.

L85 ANSWER 6 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2003:157702 TOXCENTER
DOCUMENT NUMBER: CRISP-2002-HD39428-01A1
TITLE: Fetal **exposure** to environmental toxins & **infant** outcome
AUTHOR(S): OSTREA E M J R
CORPORATE SOURCE: EOSTREA@MED.WAYNE.EDU, HUTZEL HOSPITAL, 4707 ST ANTOINE BOULEVARD, DETROIT, MI 48201:MICHIGAN
SUPPORTING ORGANIZATION (SPONSORING AGENCY): U.S. DEPT. OF HEALTH AND HUMAN SERVICES; PUBLIC HEALTH SERVICE; NATIONAL INSTITUTES OF HEALTH, NATIONAL INSTITUTE OF CHILD HEALTH AND HUMAN DEVELOPMENT
SOURCE: Crisp Data Base National Institutes of Health.
DOCUMENT TYPE: (Research)
FILE SEGMENT: CRISP
LANGUAGE: English
ENTRY DATE: Entered STN: 20030708
Last Updated on STN: 20030708

AB DESCRIPTION (provided by applicant): The **exposure** of **pregnant women** to environmental toxins is of major concern because of their potential harm on the fetus. However, the detection of fetal **exposure** to environmental toxins still remains a major challenge. We propose that meconium analysis is a promising tool to meet this challenge. Aims:

(1) To compare the prevalence and amount of fetal **exposure** to environmental toxins through the analysis of meconium, cord blood and neonatal hair and to determine the degree of agreement among these three methods, (2) to determine the relationship between the prevalence and amount of maternal **exposure** to environmental toxins during **pregnancy**, as determined by serial analyses of maternal hair and blood, to the prevalence and amount of fetal **exposure** to environmental toxins as determined by meconium, cord blood and neonatal hair analyses, and (3) to compare **adverse** immediate (birth weight, length, head circumference, gestational age) and long term (postnatal growth and neurobehavioral development up to 2 yrs from enrollment) outcomes that are associated with antenatal **exposure** to environmental toxins as determined by maternal blood, maternal hair, meconium, cord blood and neonatal hair analyses. Study design: **Pregnant women** (n=750) will be recruited, at midgestation, from the Outpatient **Clinic** of the Bulacan Provincial Hospital, Philippines and their blood and hair will be obtained at the time of recruitment and at delivery. Umbilical cord blood, meconium and neonatal hair will also be obtained. The samples will be analyzed, by atomic absorption spectrometry, for lead, mercury and cadmium and by gas chromatography/mass spectrometry for the following pesticides and their metabolites: propoxur, transfluthrin, Malathion, DDT, chlorpyrifos, bioallethrin, pretilachlor, lindane, **cyfluthrin** and cypermethrin. Pertinent maternal and **infant** data will be obtained after birth. The **infants** will be subsequently followed up at scheduled intervals for 2 years, to study their physical growth and neurobehavioral development using a battery of tests. Data analysis: The relationship between the presence/amount of environmental toxins in meconium, maternal blood, maternal hair, cord blood or neonatal hair to the immediate and two year outcome in the **infants** will be studied while controlling for potential confounders. The presence/amount of environmental toxins in maternal blood, hair, cord blood, meconium and neonatal hair will be also evaluated to determine which substrate (s) provide(s) the best index of **exposure** for a given toxin. Expected benefits: Meconium analysis may provide a powerful tool to study the prevalence and degree of fetal **exposure** to environmental toxins and its associated **adverse** effects. This project can also serve as a model for the study of environmental pollutant problems during **pregnancy** at a local, national or global level.

L85 ANSWER 13 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2005:310779 TOXCENTER
COPYRIGHT: Copyright (c) 2006 The Thomson Corporation
DOCUMENT NUMBER: PREV200510255783
TITLE: Dosimetry and biomonitoring following golfer **exposure** to pesticides
AUTHOR(S): Clark, John M. [Reprint Author]; Putnam, Raymond A.
CORPORATE SOURCE: Univ Massachusetts, Dept Vet and Anim Sci, Amherst, MA 01003 USA jclark@ent.umass.edu
SOURCE: Abstracts of Papers American Chemical Society, (MAR 13 2005) Vol. 229, No. Part 1, pp. U72.
Meeting Info.: 229th National Meeting of the American-Chemical-Society San Diego, CA, USA March 13 -17, 2005 Amer Chem Soc.
CODEN: ACSRAL. ISSN: 0065-7727.
DOCUMENT TYPE: Conference; (Meeting)
Conference; Abstract; (Meeting Abstract)
FILE SEGMENT: BIOSIS
OTHER SOURCE: BIOSIS 2005:484528
LANGUAGE: English
ENTRY DATE: Entered STN: 20051122
Last Updated on STN: 20051122

L85 ANSWER 15 OF 122 BIOSIS COPYRIGHT (c) 2006 The Thomson Corporation on STN
ACCESSION NUMBER: 2005:484551 BIOSIS
DOCUMENT NUMBER: PREV200510258806
TITLE: Pilot studies of indoor pyrethroid **exposures** of adults and their **children** using urine biomonitoring.
AUTHOR(S): Keenan, James J. [Reprint Author]; Zhang, Xiaofei; Leng,

Gabriele; Krieger, Robert I.
CORPORATE SOURCE: Univ Calif Riverside, Dept Entomol, Personal Chem Exposure Program, Riverside, CA 92521 USA
jkeen001@ucr.edu
SOURCE: Abstracts of Papers American Chemical Society, (MAR 13 2005) Vol. 229, No. Part 1, pp. U76.
Meeting Info.: 229th National Meeting of the American-Chemical-Society. San Diego, CA, USA. March 13 -17, 2005. Amer Chem Soc.
CODEN: ACSRAL. ISSN: 0065-7727.
DOCUMENT TYPE: Conference; (Meeting)
Conference; Abstract; (Meeting Abstract)
LANGUAGE: English
ENTRY DATE: Entered STN: 16 Nov 2005
Last Updated on STN: 16 Nov 2005

L85 ANSWER 16 OF 122 CAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2005:731173 CAPLUS
DOCUMENT NUMBER: 144:10293
TITLE: Pyrethroids used indoor-ambient monitoring of pyrethroids following a pest control operation
AUTHOR(S): Leng, Gabriele; Berger-Preiss, Edith; Levsen, Karsten; Ranft, Ulrich; Sugiri, Dorothee; Hadnagy, Wolfgang; Idel, Helga
CORPORATE SOURCE: Institute of Hygiene, Heinrich-Heine-University Duesseldorf, Germany
SOURCE: International Journal of Hygiene and Environmental Health (2005), 208(3), 193-199
CODEN: IJEHFT; ISSN: 1438-4639
PUBLISHER: Elsevier GmbH
DOCUMENT TYPE: Journal
LANGUAGE: English
AB House dust and airborne particles (PM) were sampled before (T1) and 1 day (T2), 4-6 mo (T3) as well as 10-12 mo (T4) after a pest control operation (PCO). **Cyfluthrin** was applied in 11, cypermethrin in 1, deltamethrin in three and permethrin in four interiors. The pyrethroid concns. in house dust and PM were measured by GC/MS with a detection limit for all pyrethroids of 0.5mg/kg house dust and of 1 ng/m3 PM for deltamethrin and permethrin and 3 ng/m3 PM for **cyfluthrin** and cypermethrin. A general background concentration of permethrin (95th percentile: 5.9mg/kg) and **cyfluthrin** (95th percentile: 3.9mg/kg) in house dust was found. In general, an appropriately performed PCO lead to an increase of pyrethroids in house dust as well as in PM, in some cases up to 1 yr after application. One day after the application the **cyfluthrin** concentration increased significantly "from 0.25 (T1) to 33.8 mg/kg house dust (T2) and up to 4.6ng/m3 in PM. The permethrin concentration increased significantly from 4.3 to 70mg/kg in house dust and up to 18.1 ng/m3 in PM, deltamethrin increased to 54.5mg/kg and 20.8 ng/m3 and cypermethrin to 14mg/kg and 45.7 ng/m3. Thereafter a continuous decrease could be observed during the time course of 1 yr. After 1 yr the permethrin concentration in house dust was still 1/5 of the T2 concentration, whereas for cypermethrin and **cyfluthrin** only 1/14 and 1/23 of the T2 concentration were found. Deltamethrin was not detected at all after T2. Moreover, the data of this study showed significant, pos. correlations between pyrethroids in house dust and in airborne particles especially one day after PCO.

L85 ANSWER 17 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2005:327048 TOXCENTER
COPYRIGHT: Copyright (c) 2006 The Thomson Corporation
DOCUMENT NUMBER: PREV200510346418
TITLE: Detection of fetal **exposure** to environmental pesticides: A comparison of various matrices
AUTHOR(S): Ostrea, E. M. Jr [Reprint Author]; Bielawski, D. M.; Posecion, N. C. Jr; Corrion, M. L.; Jin, Y.

CORPORATE SOURCE: Wayne State Univ, Dept Pediat, Detroit, MI 48202 USA
SOURCE: Pediatric Research, (AUG 2005) Vol. 58, No. 2, pp. 401. Meeting Info.: 46th Annual Meeting of the European-Society-for-Pediatric-Research Siena, ITALY August 31 -September 03, 2005 European Soc Pediat Res. CODEN: PEREBL. ISSN: 0031-3998.
DOCUMENT TYPE: Conference; (Meeting) Conference; Abstract; (Meeting Abstract)
FILE SEGMENT: BIOSIS
OTHER SOURCE: BIOSIS 2005:549532
LANGUAGE: English
ENTRY DATE: Entered STN: 20051213 Last Updated on STN: 20051213

L85 ANSWER 18 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2005:228869 TOXCENTER
DOCUMENT NUMBER: PubMed ID: 15921213
TITLE: Genotoxic effects of pentachlorophenol, lindane, transfluthrin, **cyfluthrin**, and natural pyrethrum on **human** mucosal cells of the inferior and middle nasal conchae
AUTHOR(S): Tisch Matthias; Faulde Michael K; Maier Heinz
CORPORATE SOURCE: Department of Otorhinolaryngology, Head and Neck Surgery, Bundeswehr Hospital, Ulm, Germany
SOURCE: American journal of rhinology, (2005 Mar-Apr) 19 (2) 141-51. Journal Code: 8807268. ISSN: 1050-6586.
COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
FILE SEGMENT: MEDLINE
OTHER SOURCE: MEDLINE 2005277700
LANGUAGE: English
ENTRY DATE: Entered STN: 20050830 Last Updated on STN: 20050830

AB BACKGROUND: Animal experiments and epidemiological studies suggest that pentachlorophenol (PCP) and gamma-hexachlorocyclohexane (lindane) should be classified as possible **human carcinogens.** In the past, both have had a variety of applications in the civilian and military sectors and in forestry. They have, e.g., been used to impregnate and treat uniforms and other fabrics and to control **human** lice. Animal experiments indicate that PCP in particular causes mutations and chromosome aberrations and thus DNA damage. Studies on whether or not this also applies to newer substances and especially to natural type I and type II pyrethroids still are not available. What is particularly lacking are data on the genotoxic effects of these substances on **human** target cells. Our study describes the genotoxic effects of PCP, lindane, transfluthrin, **cyfluthrin**, and natural pyrethrum on **human** mucosal cells of the inferior and middle nasal conchae. METHODS: Epithelial cells were isolated from nasal mucosa, which was removed in the surgical treatment of **chronic** sinusitis and nasal concha hyperplasia. After the cells had been tested for vitality using the trypan blue exclusion test, the short-term culture method was used. The material was incubated with PCP (0.3, 0.75, and 1.2 mmol), lindane (0.5, 0.75, and 1.0 mmol), transfluthrin (0.05, 0.1, 0.5, 0.75, and 1.0 mmol), **cyfluthrin** (0.05, 0.1, 0.5, 0.75, and 1.0 mmol), natural pyrethrum (0.001, 0.005, 0.01, 0.05, and 0.1 mmol), and N-methyl-N'-nitro-N-nitrosoguanidine for 60 minutes. Substance-induced DNA damage (single-strand and double-strand breaks) were determined using single-cell microgel electrophoresis. A fluorescence microscope was used together with an image processing system to analyze the results obtained. RESULTS: After **exposure** to all tested substances, a high percentage of the cells of the middle nasal concha in particular were found to have severely fragmented DNA as a result of strong genotoxic effects. Although the reaction of the cells of the inferior nasal concha was significantly less strong ($p < 0.001$), the tested substances were nevertheless found to have a notable genotoxic effect on these cells too. CONCLUSION: Our study strongly suggests that

exposure to PCP, lindane, transfluthrin, **cyfluthrin**, and natural pyrethrum has a genotoxic effect on the epithelial cells of **human** nasal mucosa. In addition, we have shown that nasal structures differ in susceptibility to the various pesticides used in the tests. Thus, the study provides new evidence supporting the biological plausibility of PCP- and lindane-induced effects, thereby helping evaluate potential PCP- and lindane-induced mucous membrane carcinomas of these parts of the nose. In addition, our study shows that other substances that today are widely used for controlling pests have a considerable genotoxic effect on **human** target cells. The results obtained indicate the need for additional studies on the genotoxicity of these substances and their **adverse** effects on **human health.**

L85 ANSWER 20 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2004:71734 TOXCENTER
COPYRIGHT: Copyright (c) 2006 The Thomson Corporation
DOCUMENT NUMBER: PREV200400169729
TITLE: Structure-activity and interaction effects of 14 different pyrethroids on voltage-gated chloride ion channels
AUTHOR(S): Burr, Steven A. [Reprint Author]; Ray, David E
CORPORATE SOURCE: MRC Applied Neuroscience Group, School of Biomedical Sciences, University of Nottingham, Nottingham, NG7 2UH, UK steven.burr@nottingham.ac.uk
SOURCE: Toxicological Sciences, (February 2004) Vol. 77, No. 2, pp. 341-346. print.
ISSN: 1096-6080 (ISSN print).
DOCUMENT TYPE: Article
FILE SEGMENT: BIOSIS
OTHER SOURCE: BIOSIS 2004:167977
LANGUAGE: English
ENTRY DATE: Entered STN: 20040330
Last Updated on STN: 20040330

AB We have proposed that since the type II pyrethroids deltamethrin and cypermethrin, but not the type I pyrethroid cismethrin act on chloride channels, this could contribute to the bimodal nature of pyrethroid **poisoning** syndromes. We now examine a wider range of pyrethroid structures on the activity of these calcium-independent voltage-gated maxi-chloride channels. Excised inside-out membrane patches from differentiated mouse neuroblastoma cells were used, and mean channel open probabilities calculated. For single dosing at 10 muM, bioallethrin, **beta-cyfluthrin**, cypermethrin, deltamethrin, and fenpropathrin were all found to significantly decrease open channel probability ($p<0.05$). Bifenthrin, bioresmethrin, cispermethrin, cisresmethrin, **cyfluthrin** isomers 2 and 4, lambda-cyhalothrin, esfenvalerate, and tefluthrin, did not significantly alter open channel probability ($p>0.05$). Since the type II pyrethroids, esfenvalerate, and lambda-cyhalothrin were ineffective, we must conclude that actions at the chloride ion channel target cannot in themselves account for the differences between the two types of **poisoning** syndrome. Sequential dosing with type II pyrethroids caused no further chloride ion channel closure. The type I pyrethroid cisresmethrin did however prevent a subsequent effect by the mixed type pyrethroid fenpropathrin. In contrast, the type I pyrethroid cispermethrin did not prevent a subsequent effect due to the type II pyrethroid deltamethrin. The difference in effect may be the result of differences in potency, as deltamethrin had a greater effect than fenpropathrin. It therefore appears clear that in some combinations the type I and type II pyrethroids can compete and may bind to the same chloride channel target site.

L85 ANSWER 25 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2004:329769 TOXCENTER
DOCUMENT NUMBER: DART-TER-4001785
TITLE: Meconium - The Best Matrix To Detect Fetal **Exposure** To Environmental Pesticide/Herbicide.
AUTHOR(S): Ostrea E M Jr; Bielawski D M; Posecion N C Jr; Corrion M L; Seagraves J J
CORPORATE SOURCE: Dept of Pediatrics, Wayne State University,, Detroit MI.

CONTRACT NUMBER: 1RO1HD039428001A1
SOURCE: Neurotoxicology, (2004 Jun) 25 (4) 720.
ISSN: 0161-813X.
DOCUMENT TYPE: (MEETING ABSTRACTS)
FILE SEGMENT: DART
LANGUAGE: English
ENTRY DATE: Entered STN: 20041229
Last Updated on STN: 20041229

AB The **exposure** of **pregnant women** to environmental toxins is of major concern because of their potential harm on the fetus. The aim of this study was to determine the best matrix to detect fetal **exposure** to pesticide/herbicide. Methods: **Pregnant women** were prospectively recruited at midgestation from an agricultural site in the Philippines where our preliminary survey showed a significant use at home and in the ricefields of the following pesticide/herbicide: **cyfluthrin**/propoxur (73%), chlorpyrifos (37%), cypermethrin(31%), pretilachor (28%), bioallethrin (26%), malathion (15%), diazinon (12%), transfluthrin (11%). Maternal hair and blood were obtained upon recruitment [hair (n=272), blood (283)] and at birth [hair (n=176), blood (174)]. Neonatal cord blood (n=159), hair (n=171) and meconium (n=166) were obtained at birth. All samples were analyzed for the above compounds and their known metabolites by GCMS. Results: Analysis of meconium detected the highest fetal **exposure** rate (% positive) to the various **toxicants**: propoxur =32.53%, malathion= 1.2%, bioallethrin 0.60%, pretilachlor (1.81%), DDT (1.81%) **cyfluthrin** (0.60%), cypermethrin (6.02%). Cord blood and **infant** hair were only positive for propoxur (6.94% and 0.58%, respectively). Pesticide metabolites were not seen in meconium nor cord blood. Maternal hair showed the next highest **exposure** rate: propoxur (13.12%), malathion (2.84%) chlorpyrifors (0.35%), bioallethrin (16.67%) and pretilachlor (0.35%). Conclusion: Prenatal **exposure** to environmental **toxicants** are best detected by the analysis of meconium and maternal hair. However, since meconium is fetal in origin, it represents the best matrix to detect for fetal **exposure** to various **toxicants.**

L85 ANSWER 26 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2004:329768 TOXCENTER
DOCUMENT NUMBER: DART-TER-40017841
TITLE: Maternal Hair: Ideal Matrix To Detect Maternal **Exposure** To Environmental Pesticide/Herbicide.
AUTHOR(S): Ostrea E M Jr; Bielawski D M; Posecion N C Jr; Corrion M L; Seagraves J J
CORPORATE SOURCE: Dept of Pediatrics, Wayne State University, Detroit MI.
CONTRACT NUMBER: 1RO1HD039428001A1
SOURCE: Neurotoxicology, (2004 Jun) 25 (4) 720.
ISSN: 0161-813X.
DOCUMENT TYPE: (MEETING ABSTRACTS)
FILE SEGMENT: DART
LANGUAGE: English
ENTRY DATE: Entered STN: 20041229
Last Updated on STN: 20041229

AB The **exposure** of **pregnant women** to environmental toxins is of major concern because of their potential harm on the fetus. The aim of this study was to determine an ideal matrix to detect maternal **exposure** to pesticide/herbicide during **pregnancy.** Methods: **Pregnant women** were prospectively recruited at midgestation from an agricultural site in the Philippines where our preliminary survey showed a significant use at home and in the ricefields of the following pesticide/herbicide: **cyfluthrin**/propoxur (73%), chlorpyrifos (37%), cypermethrin(31%), pretilachor (28%), bioallethrin (26%), malathion (15%), diazinon (12%), transfluthrin (11%). Maternal hair and blood were obtained upon recruitment and at birth (on those who have delivered) and analyzed for the above compounds (plus DDT) and their known metabolites by GCMS. Results: A total of 283 samples (maternal blood and hair) were obtained at midgestation and 176 samples at birth. Analysis of maternal hair detected the highest maternal **exposure** rate to the various **toxicants** and was higher in samples at midgestation compared to birth: 'propoxur (13.12% vs 3.91%),

bioallethrin (16.67% vs 6.15%), malathion (2.84% vs 0%), chlorpyrifos (0.35% vs 1.12%), pretilachlor (0.35% vs 0.56%) and DDT (0.56%). Maternal blood was positive only for propoxur (1.08% vs 11.30%). Oiazinon, lindane, transfluthrin. **Cyfluthrin** and cypermethin were not detected. Few metabolites were found and only in maternal blood: 3-phenoxybenzoic acid (3.45%) and DDE (2.47% vs 0.57%). Conclusion: There is a significant **exposure** of the **pregnant woman** to environmental pesticide/herbicide and the analysis of maternal hair, particularly at midgestation, offers the best index to detect maternal **exposure**.

L85 ANSWER 29 OF 122 EMBASE COPYRIGHT (c) 2006 Elsevier B.V. All rights reserved on STN

ACCESSION NUMBER: 2004488127 EMBASE
TITLE: Negative ion chemical ionization-gas chromatographic-mass spectrometric determination of residues of different pyrethroid insecticides in whole blood and serum.
AUTHOR: Ramesh A.; Ravi P.E.
CORPORATE SOURCE: A. Ramesh, Department of Analytical Chemistry, Mass Spectrometry Division, Intl. Inst. Biotech. Toxicol.-IIBAT, Padappai, Chennai-601 301, Tamil Nadu, India. raamesh_a@hotmail.com
SOURCE: Journal of Analytical Toxicology, (2004) Vol. 28, No. 8, pp. 660-666. .
Refs: 47
ISSN: 0146-4760 CODEN: JATOD3
COUNTRY: United States
DOCUMENT TYPE: Journal; Article
FILE SEGMENT: 029 Clinical Biochemistry
046 Environmental Health and Pollution Control
052 Toxicology
LANGUAGE: English
SUMMARY LANGUAGE: English
ENTRY DATE: Entered STN: 20041209
Last Updated on STN: 20041209

AB A new rapid and sensitive analytical method using negative ion chemical ionization-gas chromatography-mass spectrometry in selective ion monitoring mode has been developed for the determination of residues of different synthetic pyrethroid insecticides, allethrin, bifenthrin, cypermethrin, cyphonothrin, **cyfluthrin**, λ-cyhalothrin, deltamethrin, fenvalerate, fenpropathrin, permethrin, prallethrin, and frans-fluthrin, in whole blood. The residues of pyrethroid molecules were extracted from the whole blood using a hexane and acetone (8:2, v/v) solvent mixture without separating the serum. The method was found sensitive to detect the residues of pyrethroids up to the level 0.2 pg/ml. Experiments conducted with the whole blood samples at the fortification level 1-100 pg/mL showed 91-103% recovery, whereas blood serum samples collected after the fortification of pyrethroids in whole blood showed 36-54% recovery. Recovery experiments conducted by direct fortification of pyrethroids in blood serum samples showed 96-108%. The applications of the analytical method was tested by analyzing 73 **human** blood samples collected from the population exposed continuously to different pyrethroid-based formulations. None of the blood samples showed residues of pyrethroids. The results were also confirmed by the detection of the appropriate amounts in a number of these samples, which had subsequently been spiked with known quantity of pyrethroids.

L85 ANSWER 30 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2004:106339 TOXCENTER
COPYRIGHT: Copyright (c) 2006 The Thomson Corporation
DOCUMENT NUMBER: PREV200400244031
TITLE: Electron ionization gas chromatography-mass spectrometric determination of residues of thirteen pyrethroid insecticides in whole blood
AUTHOR(S): Ramesh, Atmakuru [Reprint Author]; Ravi, Perumal Elumalai
CORPORATE SOURCE: Department of Analytical Chemistry, Mass Spectrometry

Division, International Institute of Biotechnology and Toxicology-IIBAT, Padappai, Chennai, TN, 601301, India
raamesh_a@hotmail.com
SOURCE: Journal of Chromatography B, (5 April 2004) Vol. 802, No. 2, pp. 371-376. print.
ISSN: 1570-0232 (ISSN print).
DOCUMENT TYPE: Article
FILE SEGMENT: BIOSIS
OTHER SOURCE: BIOSIS 2004:240687
LANGUAGE: English
ENTRY DATE: Entered STN: 20040511
Last Updated on STN: 20040511

AB A new rapid and sensitive electron ionization gas chromatography-mass spectrometry method in selective ion monitoring mode (SIM) was developed for the determination of 13 synthetic pyrethroid insecticide molecules and their stereo isomers in whole blood. The pyrethroid insecticides investigated are allethrin, bifenthrin, cypermethrin, cyphonothrin, **cyfluthrin**, lambda-cyhalothrin, deltamethrin, fenvalerate, fenpropathrin, imiprothrin, permethrin, prallethrin and transfluthrin. The residues of pyrethroids are extracted from the whole blood using hexane and acetone mixture (80+20%) as solvent. All the pyrethroid residues were separated by using a gas chromatography-mass spectrometry operated in electron ionization mode and quantified in selective ion monitoring mode. The method can detect the residues of different pyrethroids down to the level 0.05-2 ng/ml. Recovery experiments conducted in whole blood samples at the fortification level 1-1000 ng/ml showed 91-103% recovery. The applications of the analytical method for the determination of pyrethroid residues in real samples were tested by analyzing 45 **human** blood samples collected from the population exposed continuously to different pyrethroid based formulations. The results are confirmed by spiking the known quantity of pyrethroids and subsequently their positive detection.

L85 ANSWER 32 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2004:154714 TOXCENTER
COPYRIGHT: Copyright 2006 ACS
DOCUMENT NUMBER: CA14120326890A
TITLE: Pesticide intoxications in the Centre of Portugal: three years analysis
AUTHOR(S): Teixeira, Helena; Proenca, Paula; Alvarenga, Margarida; Oliveira, Margarida; Marques, Estela P.; Vieira, Duarte Nuno
CORPORATE SOURCE: Delegation of Coimbra, National Institute of Legal Medicine, Coimbra, Port..
SOURCE: Forensic Science International, (2004) Vol. 143, No. 2-3, pp. 199-204.
CODEN: FSINDR. ISSN: 0379-0738.
COUNTRY: PORTUGAL
DOCUMENT TYPE: Journal
FILE SEGMENT: CAPLUS
OTHER SOURCE: CAPLUS 2004:540783
LANGUAGE: English
ENTRY DATE: Entered STN: 20040713
Last Updated on STN: 20050830

AB Pesticides are used in most countries around the world to protect agricultural and horticultural crops against damage. **Poisoning** by these **toxicant** agents occurs as a result of misuse or accidental **exposure**, and also by oral ingestion (voluntary or not). In Portugal, pesticide intoxications are still a cause of death, found in a considerable number of cases. The authors retrospectively examined the cases of pesticide **poisoning** in the Center of Portugal, from autopsies performed in the Forensic Pathol. Service of Coimbra's Delegation of the National Institute of Legal Medicine (NILM) and from other autopsies carried out in the Center of Portugal, as well as some samples taken in hospitals in cases of suspected intoxication. In this study, the pos. cases have been especially studied, in order to identify the pesticide used, as well as the etiol.

The frequency of intoxications and its distribution by sex and age were also analyzed. Between Jan. 2000 and Dec. 2002, the Forensic **Toxicol.** Laboratory received 639 pesticide anal. requests. In 2000, in a total of 149 anal. requests, 30 cases were pos., 63.3% from male individuals and 36.7% from female. In 2001, the anal. requests increased to 240 as well as the pos. cases (43), 74.4% from male individuals and 25.6% from female and in 2002, the total cases analyzed also increased to 250, with 38 pos. (73.6% from male individuals and 26.4% from female). Among the pesticides, organophosphorus insecticides still constitute the most important class detected in forensic intoxications, representing 63% of the total pos. cases, followed by herbicides, with 33% of the pos. results. Quinalphos is the most important organophosphorus insecticide, present in 32 of the 111 pos. cases, followed by the herbicide paraquat, detected in 31 cases. The study emphasizes the increasing number of pesticide analyses, particularly relevant for the organophosphorus compds. and herbicides. Intoxication suspicion, accidental or voluntary, seems to be the most common cause of the incidents, for which analyses are requested, but it is also evident that the putative cause is unknown in a large number of cases. Therefore, more stringent legislation and enforcement regarding the sale and distribution of these **toxic** substances are needed.

L85 ANSWER 35 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2004:34800 TOXCENTER
COPYRIGHT: Copyright (c) 2006 The Thomson Corporation
DOCUMENT NUMBER: PREV200400087855
TITLE: About the action mechanism of a pyrethroid preparation "**Bulldock**" on a functional state of isolated rat liver mitochondria
AUTHOR(S): Akinshina, N. G. [Reprint Author]; Gutnikova, A. R. [Reprint Author]
CORPORATE SOURCE: Acad. V. Vakhidov Scientific Surgical Centre, Ministry of Health, Tashkent, Uzbekistan
SOURCE: Toksikologicheskii Vestnik, (January-February 2003) No. 1, pp. 28-33. print.
ISSN: 0869-7922 (ISSN print).
DOCUMENT TYPE: Article
FILE SEGMENT: BIOSIS
OTHER SOURCE: BIOSIS 2004:66479
LANGUAGE: Russian
ENTRY DATE: Entered STN: 20040217
Last Updated on STN: 20040217
AB In experiments on isolated mitochondria in white rat liver it was shown that a pyrethroid preparation "**Bulldock**" at a dose of 0,2-6 nmol/mg protein of active ingredient causes dissociation of respiration and oxidative phosphorilation processes, modifies the activity of H+-ATP synthetase complex, induces the permeability of the internal membrane subjected to H+, Na+, K+, Ca2+, Ba2+, Mg2+ cations.

L85 ANSWER 37 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2004:167184 TOXCENTER
DOCUMENT NUMBER: RISKLINE-2004040010
TITLE: **Toxicological** profile for Pyrethrins and Pyrethroids
AUTHOR(S): Anonymous
SOURCE: Agency for Toxic Substances and Disease Registry U.S. Public Health Service, (2003) 287 p.
FILE SEGMENT: RISKLINE
LANGUAGE: English
ENTRY DATE: Entered STN: 20040803
Last Updated on STN: 20050803

L85 ANSWER 39 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2003:175952 TOXCENTER
COPYRIGHT: Copyright (c) 2006 The Thomson Corporation
DOCUMENT NUMBER: PREV200300331916

TITLE: Evaluation of **beta-cyfluthrin**: Protection of cole crops, dietary intake, and consumer **risk** assessment
AUTHOR(S): Borah, S. [Reprint Author]; Dikshit, A. K. [Reprint Author]; Lal, O. P.; Singh, R.; Sinha, S. R.; Srivastava, Y. N.
CORPORATE SOURCE: Division of Agricultural Chemicals, Indian Agricultural Research Institute, New Delhi, 110012, India
SOURCE: Bulletin of Environmental Contamination and Toxicology, (June 2003) Vol. 70, No. 6, pp. 1136-1142. print. ISSN: 0007-4861 (ISSN print).
DOCUMENT TYPE: Article
FILE SEGMENT: BIOSIS
OTHER SOURCE: BIOSIS 2003:331916
LANGUAGE: English
ENTRY DATE: Entered STN: 20030722 Last Updated on STN: 20030722

L85 ANSWER 41 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2003:289045 TOXCENTER
COPYRIGHT: Copyright (c) 2006 The Thomson Corporation
DOCUMENT NUMBER: PREV200300581873
TITLE: Biological monitoring of **workers** after the application of insecticidal pyrethroids
AUTHOR(S): Hardt, Jochen; Angerer, Juergen [Reprint Author]
CORPORATE SOURCE: Institute of Occupational, Social, and Environmental Medicine, University of Erlangen-Nuremberg, Schillerstrasse 25, 91054, Erlangen, Germany Angerer@asumed.med.uni-erlangen.de
SOURCE: International Archives of Occupational and Environmental Health, (September 2003) Vol. 76, No. 7, pp. 492-498. print. CODEN: IAEHDW. ISSN: 0340-0131.
DOCUMENT TYPE: Article
FILE SEGMENT: BIOSIS
OTHER SOURCE: BIOSIS 2003:477390
LANGUAGE: English
ENTRY DATE: Entered STN: 20031216 Last Updated on STN: 20031216

AB Objectives: Pyrethroids are applied as insecticides throughout the world. **Human** metabolism of pyrethroids results in urinary metabolites that are suitable for biological monitoring. The aim of the study was to evaluate individual **exposure** due to **occupational** application of pyrethroids as a precondition for the assessment of **health risks**. Methods: Thirty-six **workers** who applied insecticides and other pesticides in Germany collected samples of their urine (24 h) after having used various pyrethroids (alpha-cypermethrin, cypermethrin, **cyfluthrin**, deltamethrin, tau-fluvalinate, permethrin, gamma-cyhalothrin) in agriculture, greenhouses or indoor pest control. Biological monitoring was carried out and metabolites were analysed in 161 urine samples by GC-MS: cis-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropane-1-carboxylic acid and trans-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropane-1-carboxylic acid (cis-Cl2CA and trans-Cl2CA), cis-3-(2,2-dibromovinyl)-2, 2-dimethylcyclopropane-1-carboxylic acid (cis-Br2CA), 3-phenoxybenzoic acid (3-PBA) and 4-fluoro-3-phenoxybenzoic acid (FPBA). Forty-five urine specimens collected (24 h) from persons with no **occupational exposure** to pyrethroids served as controls. Concentrations were related to creatinine content and expressed as micrograms per gramme creatinine. Results: Control urine samples revealed a considerable background excretion of pyrethroid metabolites by the general population. The 95th percentile of the concentrations of Cl2CA and cis-Br2CA were 2.1 and 0.1 mug/g creatinine, respectively. FPBA was not detected in any control urine and was found in only one sample within the complete study. After **occupational** application of pyrethroids the highest concentrations of metabolites in urine samples

were detected within the group of indoor pest-control operators. The maximum concentrations (median values) of Cl2CA, 3-PBA, and cis-Br2CA were 92.4 mug/g (1.8 mug/g), 57.5 mug/g (1.4 mug/g) and 1.1 mug/g (median below detection limit), respectively. **Workers** in greenhouses excreted metabolites with median concentrations as follows: 2.9 mug/g Cl2CA, 0.5 mug/g cis-Br2CA and 2.9 mug/g 3-PBA. Medians of the metabolite concentrations in specimens from agricultural **workers** were below the detection limit with regard to Cl2CA and cis-Br2CA, but the value was 0.6 mug/g for 3-PBA. Pest-control operators excreted significantly higher concentrations of Cl2CA and 3-PBA than **workers** in agriculture on a collective basis. Comparison of the excreted concentrations of metabolites with values of acceptable daily intake (ADI) of pyrethroids set by WHO revealed that the amount of pyrethroids that had been taken up during **occupational** application was not considerably higher than the ADI. Conclusions: As a consequence, we conclude that **adverse health** effects are not to be expected after **workers' occupational exposure** to pyrethroids in Germany, provided that the application is carried out properly. Good working practices need to be supported by adequate supervision with regard to **occupational** hygiene and medicine.

L85 ANSWER 43 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2003:168994 TOXCENTER
DOCUMENT NUMBER: PubMed ID: 12708229
TITLE: Pyrethroids used indoors--biological monitoring of **exposure** to pyrethroids following an indoor pest control operation
AUTHOR(S): Leng Gabriele; Ranft Ulrich; Sugiri Dorothee; Hadnagy Wolfgang; Berger-Preiss Edith; Idel Helga
CORPORATE SOURCE: Institute of Hygiene, Heinrich-Heine-University, Dusseldorf, Germany. gabriele.leng.gl@bayer-ag.de
SOURCE: International journal of hygiene and environmental health, (2003 Mar) 206 (2) 85-92.
Journal Code: 100898843. ISSN: 1438-4639.
COUNTRY: Germany: Germany, Federal Republic of
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
FILE SEGMENT: MEDLINE
OTHER SOURCE: MEDLINE 20031897 5
LANGUAGE: English
ENTRY DATE: Entered STN: 20030715
Last Updated on STN: 20030715

AB A prospective epidemiological study with respect to pyrethroid **exposure** was carried out combining **clinical** examination, indoor monitoring and biological monitoring. The results of the biological monitoring are presented. Biological monitoring was performed in 57 persons before (T1) as well as 1 day (T2), 3 days (T3), 4-6 months (T4), and 10-12 months (T5) following a pest control operation (PCO) with pyrethroid containing products such as **cyfluthrin**, cypermethrin, deltamethrin or permethrin. Pyrethroids in blood were measured by GC-ECD. The respective metabolities cis- and trans-3-(2,2-dichlorovinyl)-2,2- dimethylcyclopropane carboxylic acid (DCCA), cis-3-(2,2-dibromovinyl)-2,2- dimethylcyclopropane carboxylic acid (DBCA), 3-phenoxybenzoic acid (3-PBA) and fluorophenoxybenzoic acid (FPBA) were measured in urine using GC/MS. For all cases the concentrations of pyrethroids in blood were found to be below the detection limit of 5 micrograms/l before and after the PCO. With a detection limit of 0.2 microgram/l of the investigated metabolites, the percentage of positive samples were 7% for cis-DCCA, 3.5% for trans-DCCA and 5.3% for 3-PBA before PCO. One day after PCO (T2) the percentage of positive samples increased remarkably for cis-DCCA (21.5%), trans-DCCA (32.1%) and 3-PBA (25%) showing significantly increased internal doses as compared to pre-existing values. This holds also true for T3, whereas at T4 and T5 the significant increase was no more present. FPBA and DBCA concentrations were below the respective detection limit before PCO and also in most cases after PCO. In 72% of the subjects the route of pyrethroid uptake (measured by determining the DCCA isomeric ratio) was oral/inhalative and in 28% it was **dermal.** Based on the biological monitoring data it could be shown that appropriately performed pest control operations lead to a significant increase of pyrethroid metabolite concentration in the early phase (1 and 3 days) after pyrethroid application as compared

to the pre-**exposure** values. However, evaluated metabolite concentrations 4-6 months after PCO did not exceed values of published background levels.

L85 ANSWER 45 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2005:113829 TOXCENTER
COPYRIGHT: Copyright (c) 2006 The Thomson Corporation
DOCUMENT NUMBER: PREV200500147725
TITLE: 5-HT loss in rat brain by type II pyrethroid insecticides
AUTHOR(S): Martinez-Larranaga, Maria R. [Reprint Author]; Anadon, Arturo; Martinez, Maria A.; Martinez, Marta; Castellano, Victor J.; Diaz, Maria J.
CORPORATE SOURCE: Fac Med VetDept Pharmacol and Toxicol, Univ Complutense Madrid, E-28040, Madrid, Spain mrml@vet.ucm.es
SOURCE: Toxicology and Industrial Health, (2003) Vol. 19, No. 7-10, pp. 147-155. print.
CODEN: TIHEEC. ISSN: 0748-2337.
DOCUMENT TYPE: Article
FILE SEGMENT: BIOSIS
OTHER SOURCE: BIOSIS 2005:146976
LANGUAGE: English
ENTRY DATE: Entered STN: 20050419
Last Updated on STN: 20050419

AB Study objective: Type II pyrethroids are a group of insecticides largely used in agriculture and public **health**. The nervous system is the main target for pyrethroids in insects and **mammals**. One notable form of **toxicity** associated with over **exposure** has been a facial cutaneous paraesthesia and irritation-related respiration symptoms including behavioural excitation mainly observed in **workers** spraying pyrethroids or in **occupational** settings. In acutely exposed rats, type II pyrethroids produce a severe syndrome characterized by salivation and choreoathetosis. Because many of the **acute** functional effects of type II pyrethoids can be associated with the neurotoxic effect on 5-hydroxytryptamine (5-HT) neurones, the objective of the present study was to examine whether deltamethrin, **cyfluthrin** and lambda-cyflalothrin administration results in changes of 5-HT content in rat brain. Characterizing this target will help us to better understand the **toxicological** effects of type II pyrethroids. Design: Rats were injected with either corn oil or pyrethroids (deltamethrin, 20 mg/kg per day, i.p., for 6 days; **cyfluthrin**, 14 mg/kg per day, i.p., for 6 days; lambda-cyflalothrin, 8 mg/kg per day, i.p., for 6 days). The frontal cortex, hippocampus, midbrain and striatum were removed at 24 hours post treatment and were analysed for content of 5-HT and 5-HIAA using a HPLC method with electrochemical detection. Results: A serotonin depleting effect was produced by these type II pyrethroids. The concentration of 5-HT and its metabolite 5-HIAA decreased in the brain regions from pyrethroid treated animals. Pyrethroids accelerated the turnover of 5-HT in midbrain and striatum areas. It is concluded that pyrethroids affect serotonin neurotransmission.

L85 ANSWER 46 OF 122 CAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2003:293228 CAPLUS
DOCUMENT NUMBER: 138:380654
TITLE: Monitoring of pesticide residues in **human** milk
AUTHOR(S): Parveen, Zahida; Masud, S. Zafar
CORPORATE SOURCE: Pesticide Research Laboratories, Pakistan Agriculture Research Council, Karachi University Campus, Karachi, 75270, Pak.
SOURCE: Pakistan Journal of Scientific and Industrial Research (2003), 46(1), 43-46
CODEN: PSIRAA; ISSN: 0030-9885
PUBLISHER: Pakistan Council of Scientific and Industrial Research
DOCUMENT TYPE: Journal
LANGUAGE: English

AB After establishing proper anal. methodol. for multiple pesticide residues, cotton-growing areas of Multan Division of Pakistan were surveyed and 40 samples of **human** milk from cotton pickers were collected during 2 crop seasons. Screening of these samples showed 72.5% contamination with 19 different pesticides/metabolites. The most frequently occurring pesticides were DDT and its metabolites, dimethoate, cyhalothrin, monocrotophos, profenofos, and quinalphos.

L85 ANSWER 50 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2003:83201 TOXCENTER
COPYRIGHT: Copyright 2006 ACS
DOCUMENT NUMBER: CA139132012766
TITLE: **Human exposure** to indoor residential **cyfluthrin** residues during a structured activity program
AUTHOR(S): Williams, Ryan L.; Bernard, Craig E.; Krieger, Robert I.
CORPORATE SOURCE: Environmental Toxicology Graduate Program, University of California, Riverside, CA, USA.
SOURCE: Journal of Exposure Analysis and Environmental Epidemiology, (2003) Vol. 13, No. 2, pp. 112-109. CODEN: JEAEE9. ISSN: 1053-4245.
COUNTRY: UNITED STATES
DOCUMENT TYPE: Journal
FILE SEGMENT: CAPLUS
OTHER SOURCE: CAPLUS 2003:264580
LANGUAGE: English
ENTRY DATE: Entered STN: 20030408
Last Updated on STN: 20050830

AB Estns. of absorbed daily dosage (ADD) of chems. following contact with treated surfaces may be required for **risk** assessment and **risk** management. Measurements of ADD based upon biomonitoring are a more reliable data than ests. of ADD from environmental measurements since they require fewer default assumptions. Study participants performed a structured activity program (SAP) 24-h after an application of Tempo 20 WP (**cyfluthrin**; 3-(2,2-dichloroethenyl)-2,2-dimethyl- cyclopropanecarboxylic acid cyano(4-fluoro-3-phenoxy-phenyl)methyl ester) on a medium pile, plush nylon carpet. Measurements of total **cyfluthrin** residue and transferable **cyfluthrin** residue (cotton cloth and California Department of Food and Agriculture (CDFA) roller; personal sock and short dosimetry) were made at 3, 7, 12, 23, 47.5, and 407.5 h. Total **cyfluthrin** residue extracted from (Soxhlet extraction) carpet was 11.1 ± 2.7 μg/cm2 1 h prior to the SAP. Transferable **cyfluthrin** residue obtained through anal. of cotton cloths rolled with a weighted 30-lb cylinder was 0.11 μg/cm2. **Cyfluthrin** residues from socks and shorts were 0.71 ± 0.23 and 0.15 ± 0.03 μg/cm2, resp. Urine was collected at 12-h intervals during a 72-h period following the SAP and was analyzed for the **cyfluthrin** biomarker, 4-fluoro-3-phenoxybenzoic acid (FPBA). The mean **cyfluthrin** equivalent excreted were 10.4 ± 5.7 μg/person (yielding an absorbed dosage of 0.10 μg/kg; n = 7). The elimination half-life was 16 ± 5 h. All predicted ADDs based upon environmental measurements overestimated the ADDs measured by urinary excretion.

L85 ANSWER 53 OF 122 BIOSIS COPYRIGHT (c) 2006 The Thomson Corporation on STN
ACCESSION NUMBER: 2002:480565 BIOSIS
DOCUMENT NUMBER: PREV200200480565
TITLE: Relationship between volatile and dislodgeable foliar residues and golfer **exposure** from treated turf.
AUTHOR(S): Edwards, R. N. [Reprint author]; Putnam, R. A. [Reprint author]; Carrier, S. A. [Reprint author]; Doherty, J. J. [Reprint author]; Mamedova, S. A. [Reprint author]; Clark, J. M. [Reprint author]
CORPORATE SOURCE: Massachusetts Pesticide Analysis Laboratory, University of Massachusetts, 101 Agr Eng Bld, Amherst, MA, 01003, USA rne@ent.umass.edu
SOURCE: Abstracts of Papers American Chemical Society, (2002) Vol. 224, No. 1-2, pp. AGRO 46. print.

Meeting Info.: 224th National Meeting of the American Chemical Society. Boston, MA, USA. August 18-22, 2002.
CODEN: ACSRAL. ISSN: 0065-7727.
DOCUMENT TYPE: Conference; (Meeting)
Conference; Abstract; (Meeting Abstract)
LANGUAGE: English
ENTRY DATE: Entered STN: 11 Sep 2002
Last Updated on STN: 11 Sep 2002

L85 ANSWER 54 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2002:244784 TOXCENTER
DOCUMENT NUMBER: PubMed ID: 12191872
TITLE: Pyrethroid **exposure** of the general population-is this due to diet
AUTHOR(S): Schettgen Thomas; Heudorf Ursel; Drexler Hans; Angerer Jurgen
CORPORATE SOURCE: Institute and Outpatient Clinic of Occupational, Social and Environmental Medicine, Friedrich-Alexander University of Erlangen-Nurnberg, Schillerstrasse 25/29, D-91054, Erlangen, Germany
SOURCE: Toxicology letters, (2002 Aug 5) 134 (1-3) 141-5.
Journal Code: 7709027. ISSN: 0378-4274.
COUNTRY: Netherlands
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
FILE SEGMENT: MEDLINE
OTHER SOURCE: MEDLINE 2002498942
LANGUAGE: English
ENTRY DATE: Entered STN: 20021029
Last Updated on STN: 20021029

AB Inhabitants (1177) of a residential area in Frankfurt/Main have been investigated with respect to internal **exposure** to pyrethroids. Biological monitoring revealed a body burden of pyrethroids. The 95th per thousand for the urinary metabolites of pyrethroids, such as permethrin and cypermethrin, cis and trans-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropane-1-carboxylic acid (cis-DCCA and trans-DCCA), was determined to be 0.5 and 1.4 microg/l, respectively. 95th per thousand for cis-3-(2,2-dibromovinyl)-2,2-dimethylcyclopropane-1-carboxylic acid (DBCA), a specific metabolite of deltamethrin, and 4-fluoro-3- phenoxybenzoic acid (F-PBA), a metabolite of **cyfluthrin**, were 0.3 and 0.27 microg/l, respectively. The metabolic pattern found for these samples points out that pyrethroids are probably ingested orally with daily diet.

L85 ANSWER 63 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2000:100635 TOXCENTER
COPYRIGHT: Copyright (c) 2006 The Thomson Corporation
DOCUMENT NUMBER: PREV200000530062
TITLE: Effect of **cyfluthrin** on antipyrine pharmacokinetics and metabolism in rats
AUTHOR(S): Martinez-Larranaga, M. R. [Reprint author]; Fernandez, R. [Reprint author]; Diaz, M. J. [Reprint author]; Martinez, M. A. [Reprint author]; Frejo, M. T. [Reprint author]; Martinez, M. [Reprint author]; Tafur, M. [Reprint author]; Anadon, A. [Reprint author]
CORPORATE SOURCE: Department of Toxicology and Pharmacology, Faculty of Veterinary Medicine, Complutense University, 28040, Madrid, Spain
SOURCE: Toxicology Letters (Shannon), (September 1st, 2000) Vol. 116, No. Suppl. 1, pp. 55. print.
Meeting Info.: EUROTOX 2000 (Association of European Toxicologists) London, England September 17-20, 2000
CODEN: TOLED5. ISSN: 0378-4274.
DOCUMENT TYPE: Conference; (Meeting)
Conference; Abstract; (Meeting Abstract)

FILE SEGMENT: BIOSIS
OTHER SOURCE: BIOSIS 2000:530062
LANGUAGE: English
ENTRY DATE: Entered STN: 20011116
Last Updated on STN: 20020115

L85 ANSWER 71 OF 122 EMBASE COPYRIGHT (c) 2006 Elsevier B.V. All rights reserved on STN
ACCESSION NUMBER: 1999034139 EMBASE
TITLE: [Dose markers as against susceptibility markers in appraising the **risk** entailed in handling pesticides]. DOSIS-MARKER KONTRA SUSZEPTIBILITATS-MARKER IN DER RISIKO-BEWERTUNG DES PESTIZID-UMGANGES.
AUTHOR: Leng G.; Lewalter J.
CORPORATE SOURCE: Dr. G. Leng, Inst. Hyg. H.-Heine-Univ. Dusseldorf, Moorenstrasse 5, 40225 Dusseldorf, Germany
SOURCE: Arbeitsmedizin Sozialmedizin Umweltmedizin, (1999) Vol. 34, No. 1, pp. 24-29. .
Refs: 35
ISSN: 0944-6052 CODEN: ASOUEO
COUNTRY: Germany
DOCUMENT TYPE: Journal; Article
FILE SEGMENT: 035 Occupational Health and Industrial Medicine
LANGUAGE: German
SUMMARY LANGUAGE: English; German
ENTRY DATE: Entered STN: 19990211
Last Updated on STN: 19990211

AB Aim: This study presents criteria for assessing the handling of pesticides. Methods: A group of 1005 **workers** exposed to methyl- or ethyl- parathion (organophosphate), propoxur (carbamate) and **cyfluthrin** (pyrethroid) was investigated. The following parameters were determined in the biological monitoring: parathion and paraoxon in plasma and p-nitrophenol in urine for parathion **exposure**, propoxur in plasma and 2-isopropoxyphenol in urine for propoxur **exposure**, and **cyfluthrin** in plasma and 4-fluoro-3-phenoxybenzoic acid in urine for **cyfluthrin exposure.** In monitoring the effects, the cholinesterase and acetylcholinesterase activities were determined on **exposure** to parathion and propoxur. No effect marker for **cyfluthrin** is known as yet. Results: Overall, the unchanged agents in the plasma correlated with the symptoms mentioned, whereas there was no correlation between the metabolites in the urine and the symptoms. With comparable levels of **exposure** to propoxur, only people with low initial acetylcholinesterase activity developed symptoms. **Workers** who metabolised **cyfluthrin** rapidly reported symptoms less often than **workers** with a lower metabolisation rate. This tendency was also evident on mixed **exposure** (**cyfluthrin** and parathion). Conclusions: In the assessment of pesticide **exposure** the individual susceptibility has to be considered.

L85 ANSWER 72 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1999:157721 TOXCENTER
COPYRIGHT: Copyright 2006 ACS
DOCUMENT NUMBER: CA13118238996C
TITLE: The influence of individual susceptibility in pyrethroid **exposure**
AUTHOR(S): Leng, Gabriele; Lewalter, Jurgen; Rohrig, Brigitte; Idel, Helga
CORPORATE SOURCE: Institute of Hygiene, Heinrich-Heine-University Dusseldorf, Dusseldorf, D-40225, Germany.
SOURCE: Toxicology Letters, (1999) Vol. 107, No. 1-3, pp. 123-130. CODEN: TOLED5. ISSN: 0378-4274.
COUNTRY: GERMANY, FEDERAL REPUBLIC OF
DOCUMENT TYPE: Journal
FILE SEGMENT: CAPLUS
OTHER SOURCE: CAPLUS 1999:377906
LANGUAGE: English
ENTRY DATE: Entered STN: 20011116

Last Updated on STN: 20020509

AB The aim of this study was to find a suitable biomarker for pyrethroid **adverse** effects. It was shown that there is a correlation between the half-life time (t1/2) of pyrethroids in plasma and the clin. findings. The authors hypothesized that this finding indicates an interindividual different amount of total esterase activity or even a polymorphism. By in vitro expts. it was demonstrated that pyrethroids are cleaved by carboxylesterases. After it turned out that carboxylesterase activity in **human** plasma is too low for detection, a method for the specific determination of carboxylesterase activity in **human** isolated lymphocytes was developed. As a substrate for carboxylesterase activity, **cyfluthrin** was added to the lymphocyte suspension. As a proof for **cyfluthrin** degradation by carboxylesterases the produced hydrocyanic acid was determined by GC/MS. First hints for interindividual differences in carboxylesterase activity in lymphocytes were found.

L85 ANSWER 75 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1998:203006 TOXCENTER
COPYRIGHT: Copyright 2006 ACS
DOCUMENT NUMBER: CA13006062225P
TITLE: Assessment of pyrethroid-induced paraesthesias: comparison of animal model and **human** data
AUTHOR(S): Pauluhn, J.; Machemer, L. H.
CORPORATE SOURCE: Institute of Toxicology, Bayer AG, Wuppertal, 42096, Germany.
SOURCE: Toxicology Letters, (1998) Vol. 96-97, pp. 361-368. CODEN: TOLED5. ISSN: 0378-4274.
COUNTRY: GERMANY, FEDERAL REPUBLIC OF
DOCUMENT TYPE: Journal
FILE SEGMENT: CAPLUS
OTHER SOURCE: CAPLUS 1998:713910
LANGUAGE: English
ENTRY DATE: Entered STN: 20011116
Last Updated on STN: 20020509

AB The quantification of upper respiratory tract (URT) sensory irritation is considered to be important in rodent inhalation studies, since it may be also used as an endpoint mimicking trigeminal paraesthesias observed in **humans**. URT sensory irritation is known to be associated with rodent-specific secondary physiol. effects such as the depression of body temperature and changes in heart rate. In acutely exposed rats, these endpoints have been addressed by telemetrical measurements. The anal. of the ventilation pattern during **acute** inhalation studies of rats exposed to the α-cyano-pyrethroid **cyfluthrin** demonstrates that concentration-dependent URT sensory irritation was associated with a hypothermic response. The no-effect levels [NO(A)EL] based on the URT sensory irritation endpoint following **acute** inhalation **exposure** for 1 h and following a repeated 4-wk or 13-wk inhalation **exposure** for 6 h/day on 5 days/wk were virtually identical (≈0.1 mg/m3 air). An addnl. objective was to examine whether **human** volunteers experience comparable signs when acutely exposed for 1 h to airborne concns. slightly above or in the range of the NO(A)EL. In **human** volunteers there were no clin. significant or pyrethroid-related abnormalities in vital signs, ECG's, or in any clin. laboratory tests after either **exposure**, although transient effects related to URT (sensory) irritation were reported. Thus, an initial actual **exposure** concentration of ≈0.1 mg **cyfluthrin** /m3 air appears to be in the range of the sensory irritant threshold concentration for both rats and **humans**. With regard to physiol. afferent portal-of-entry effects, the interspecies response was consistent.

L85 ANSWER 79 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1998:105293 TOXCENTER
COPYRIGHT: Copyright 2006 ACS
DOCUMENT NUMBER: CA12812137345X
TITLE: **Human** dose-excretion studies with the pyrethroid insecticide **cyfluthrin**: urinary metabolite profile following inhalation

AUTHOR(S): Leng, G.; Leng, A.; Kuhn, K.-H.; Lewalter, J.; Pauluhn, J.
CORPORATE SOURCE: Institute of Hygiene, Heinrich-Heine-University Dusseldorf, Dusseldorf, 40225, Germany.
SOURCE: Xenobiotica, (1997) Vol. 27, No. 12, pp. 1273-1283. CODEN: XENOBH. ISSN: 0049-8254.
COUNTRY: GERMANY, FEDERAL REPUBLIC OF
DOCUMENT TYPE: Journal
FILE SEGMENT: CAPLUS
OTHER SOURCE: CAPLUS 1998:48677
LANGUAGE: English
ENTRY DATE: Entered STN: 20011116
Last Updated on STN: 20020605

AB Nine male volunteers were exposed to the pyrethroid insecticide **cyfluthrin**. The study was performed in an **exposure** room, where an aerosol containing **cyfluthrin** was sprayed to obtain atmospheres with mean **cyfluthrin** concns. of 160 and 40 μg/m3. Four volunteers were exposed for 10, 30 and 60 min at 160 μg/m3 and another five volunteers were exposed for 60 min at 40 μg/m3. For 160 μg/m3 **exposure** urine samples were collected before and immediately after **exposure** as well as for the periods 1-2, 2-3, 3-4, 4-5, 5-6, 6-12 and 12-24 h after **exposure**. For 40 μg/m3 **exposure** urine samples were collected before and 2 h after **exposure**. The main urinary **cyfluthrin** metabolites, cis-/trans-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid (DCCA) and 4-fluoro-3-phenoxybenzoic acid (FPBA), were determined The limit of detection (LOD) for all metabolites was 0.0025 μg in an urine sample of 5 mL (0.5 μg/l). After inhalative **exposure** of 40 μg **cyfluthrin**/m3 air for 60 min, the amount of metabolites in urine collected in the first 2 h after **exposure** was less than the LOD, namely 0.14 μg for cis-DCCA, 0.15-0.28 μg for trans-DCCA and 0.12-0.23 μg for FPBA. Of the metabolites, 93% was excreted within the first 24 h (peak excretion rates between 0.5 and 3 h) after inhalative **exposure** of 160 μg/m3. The mean half-lives were 6.9 h for cis-DCCA, 6.2 h for trans-DCCA and 5.3 h for FPBA. The mean trans-:cis-DCCA ratio was 1.9 for the time course as well as for each subject. The amount of metabolites in urine depends on the applied dose, on the **exposure** time and shows interindividual differences.

L85 ANSWER 81 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1997:205078 TOXCENTER
COPYRIGHT: Copyright 2006 ACS
DOCUMENT NUMBER: CA127201-4009J
TITLE: Evaluation of possible **toxic** effects of **cyfluthrin** during short-term, relevant community **exposure**
AUTHOR(S): Satpathy, S. K.; Tyagi, P. K.; Das, B. S.; Srivastava, P.; Yadav, R. S.
CORPORATE SOURCE: Dep. Internal Medicine and Biochemistry, Ispat General Hospital, Rourkela, 769005, India.
SOURCE: Bulletin of Environmental Contamination and Toxicology, (1997) Vol. 59, No. 5, pp. 681-687. CODEN: BECTA6. ISSN: 0007-4861.
COUNTRY: INDIA
DOCUMENT TYPE: Journal
FILE SEGMENT: CAPLUS
OTHER SOURCE: CAPLUS 1997:688138
LANGUAGE: English
ENTRY DATE: Entered STN: 20011116
Last Updated on STN: 20020618

AB This paper reports results of the evaluation of possible **toxic** effects of **cyfluthrin** during short term **exposure** of bed net (mosquito nets) impregnators and users in India, under operational conditions. Adult male volunteers aged between 18-25 yr who had no previous **exposure** to pyrethroids participated in the tests on impregnators. The study showed that short term **exposure** with **cyfluthrin** had no **toxic** effects on renal,

hepatic, pulmonary function and nerve conduction and the nets impregnated at 50 mg/m2 are safe to use.

L85 ANSWER 88 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1997:19185 TOXCENTER
DOCUMENT NUMBER: PubMed ID: 9035787
TITLE: **Toxicologic** evaluation of pyrethroids in indoor air: demonstrated with the example of **cyfluthrin** and permethrin
AUTHOR(S): Pauluhn J; Steffens W; Haas J; Machemer L; Miksche L K; Neuhauser H; Schule S
CORPORATE SOURCE: Bayer AG, Institut fur Toxikologie, Wuppertal
SOURCE: Gesundheitswesen (Bundesverband der Arzte des Offentlichen Gesundheitsdienstes (Germany)), (1996 Oct) 58 (10) 551-6. Journal Code: 9204210. ISSN: 0941-3790.
COUNTRY: GERMANY: Germany, Federal Republic of
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
FILE SEGMENT: MEDLINE
OTHER SOURCE: MEDLINE 97103931
LANGUAGE: German
ENTRY DATE: Entered STN: 20011116
Last Updated on STN: 20011116

AB Pyrethroids have varying activities depending on vehicle or route of administration (oral, **dermal**, inhalational). Specific features like the sensory irritation potential of the alpha-cyano-pyrethroids on the respiratory tract can only be quantified adequately by inhalation testing. Thus equitoxic dosages can vary between inhalative and oral application, especially for alpha-cyano-pyrethrolds. The no-effect values for **chronic exposures** derived for permethrin (type I pyrethroid) and **cyfluthrin** (type II pyrethroid) show clearly, that each pyrethroid has to be considered as an individual substance **toxicologically**, and that any extrapolation from the oral to the inhalative route should only be done after a thorough assessment of the specific **toxicological** profile. The study of simulated pest control measures on carpets pretreated with permethrin showed, that no significant enrichment of permethrin in total dust could be seen from a carpet additionally treated with pyrethroids. The missing correlation between absolute (mg pyrethroid/m3 air) and relative (mg pyrethroid/kg dust) concentrations in air-borne dust as well as the low degree of translocation of pyrethroids from carpets (only about 0.044% x m(-2) x h(-1) of the **cyfluthrin** applied to the carpet can be regarded as possibly respirable) prove, that analyses of pyrethroids in household sedimented dust ("vacuum cleaner bag analyses") without knowing the absolute surface concentration and respective air concentrations are of little value for **risk** assessment. The data allow the conclusion, that a scientific assessment of **health risks** is only possible based on absolute concentrations of pyrethroids in indoor air.

L85 ANSWER 89 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1996:222234 TOXCENTER
COPYRIGHT: Copyright 2006 ACS
DOCUMENT NUMBER: CA12604043795A
TITLE: **Risk** assessment of pyrethroids following indoor use
AUTHOR(S): Pauluhn, J.
CORPORATE SOURCE: BAYER AG, Inst. Toxicology, Wuppertal, 42096, Germany.
SOURCE: Toxicology Letters, (1996) Vol. 88, No. 1-3, pp. 339-348. CODEN: TOLED5. ISSN: 0378-4274.
COUNTRY: GERMANY, FEDERAL REPUBLIC OF
DOCUMENT TYPE: Journal
FILE SEGMENT: CAPLUS
OTHER SOURCE: CAPLUS 1996:763057
LANGUAGE: English
ENTRY DATE: Entered STN: 20011116
Last Updated on STN: 20020618

AB For the appropriate assessment of pyrethroids in the indoor environment, it would be helpful to have an objective laboratory assay to confirm and quantitate the degree

of sensory irritation evoked by airborne pyrethroids. A bioassay was established using the nociceptive system of mice and rats to assess the extent of pyrethroid-related sensory irritation to the respiratory tract. For anal., aerosolized **Cyfluthrin** was selected due to the greater potency of the α-cyano pyrethroids to evoke sensory irritation. Addnl., this pyrethroid was tested in a carpet-model to assess the extent to which pyrethroid-laden dust from carpets is likely to become airborne following continuous brushing. Comparative evaluations of the sensory irritation potential of aerosolized **Cyfluthrin** in mice and rats revealed that for assessment of the sensory irritant threshold concentration, rats appeared to be more susceptible than mice. Measurements performed repeatedly during subacute **exposure** to the pyrethroid (6 h/day, 5 days/wk for 4 consecutive weeks) did not indicate any alteration in responsiveness, and the magnitude of changes in breathing patterns was similar to those observed following **acute** 1-h **exposure.** These findings confirm the conclusion that α-cyano-pyrethroids appear to act as "pure" sensory irritants and that the effects observed are non-cumulative and transient in nature. Concomitant respiratory tract inflammation and ensuing changes in susceptibility-common findings in chemical sensory irritants-did not occur. From the studies addressing the dislodgeability of pyrethroid containing dust from carpets, it is apparent that measurement of deposited dust is a poor substitute for airborne dust. Even under worst-case testing conditions (continuous brushing of the carpet for approx. 19 h in a bias-flow compartment), only a very small fraction of the pyrethroid laden dust particles charged to the carpet could be recovered airborne (0.04%/m2 per h). Thus, exptl. findings support the conclusion that such agents cannot be dislodged from carpets to an extent that todicol. significant airborne concns. are attained. Therefore, assessment of **health** hazards in the indoor environment based solely on "vacuum cleaner" sampling is prone to a high level of errors and misjudgment.

L85 ANSWER 91 OF 122 BIOSIS COPYRIGHT (c) 2006 The Thomson Corporation on STN
ACCESSION NUMBER: 1996:454633 BIOSIS
DOCUMENT NUMBER: PREV199699176989
TITLE: Studies of possible side-effects of using **cyfluthrin**-treated bednets.
AUTHOR(S): Yadav, R. S. [Reprint author]; Satpathy, S. K.; Tyagi, P. K. [Reprint author]; Das, B. S.; Srivastava, P.
CORPORATE SOURCE: Malaria Res. Cent., 22-Sham Marg, Delhi 110 054, India
SOURCE: Annals of Tropical Medicine and Parasitology, (1996) Vol. 90, No. 4, pp. 436.
Meeting Info.: Seventh Malaria Meeting of the British Society for Parasitology. London, England, UK. September 18-20, 1995.
CODEN: ATMPA2. ISSN: 0003-4983.
DOCUMENT TYPE: Conference; (Meeting)
Conference; Abstract; (Meeting Abstract)
LANGUAGE: English
ENTRY DATE: Entered STN: 7 Oct 1996
Last Updated on STN: 7 Oct 1996

L85 ANSWER 100 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1995:20827 TOXCENTER
DOCUMENT NUMBER: PubMed ID: 7819676
TITLE: Statistical description of **health** complaints after pyrethroid **exposure**
AUTHOR(S): Scherb H; Weigelt E
CORPORATE SOURCE: Medis-Institut, GSF-Forschungszentrum fur Umwelt und Gesundheit, Neuherberg
SOURCE: Gesundheitswesen (Bundesverband der Arzte des Offentlichen Gesundheitsdienstes (Germany)), (1994 Nov) 56 (11) 622-8.
Journal Code: 9204210. ISSN: 0941-3790.
COUNTRY: GERMANY: Germany, Federal Republic of

DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
FILE SEGMENT: MEDLINE
OTHER SOURCE: MEDLINE 95119508
LANGUAGE: German
ENTRY DATE: Entered STN: 20011116
Last Updated on STN: 20011116

AB In 96 pyrethroid-exposed persons data on subjective **health** impairment were collected by means of a questionnaire. The present explorative statistical analysis is restricted to a subgroup of 51 out of the 96 persons for which pyrethroid concentrations in dust samples from residential dwellings or from work places could be determined. Since measurements were taken from dwellings or work places, there is in some cases only one common measured value for families or teams. In total, we have 34 independent measurements. Based on the type of measured **exposures**, the 51 participants can be divided into 3 groups: 26 cases exposed to permethrin and tetramethrin (type-I pyrethroids), 13 cases exposed to deltamethrin, **cyfluthrin** or cypermethrin (type-II pyrethroids), and 12 cases with mixed **exposure** to the mentioned type-I and type-II pyrethroids. For the 3 groups we computed weighted mean values of pyrethroid concentrations, each independent measurement being weighted with the number of corresponding persons. The mean values are 425.7, 56.1, and 958.9 mg pyrethroid/kg dust for the groups in the above order. After combining the two highly exposed groups into one new group with now 38 members and a mean pyrethroid concentration of 594.1 mg/kg, an increased frequency of **health** complaints was found as compared to the group exposed only to type-II pyrethroids.

L85 ANSWER 113 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1988:85983 TOXCENTER
COPYRIGHT: Copyright (c) 2006 The Thomson Corporation
DOCUMENT NUMBER: PREV198886054123
TITLE: THE EFFECTS OF TYPE I AND II PYRETHROIDS ON MOTOR ACTIVITY AND THE ACOUSTIC STARTLE RESPONSE IN THE RAT
AUTHOR(S): CROFTON K M [Reprint author]; REITER L W
CORPORATE SOURCE: NEUROTOXICOL DIV, HEALTH EFFECTS RES LAB, US ENVIRON PROTECTION AGENCY, RESEARCH TRIANGLE PARK, NC 27711, USA
SOURCE: Fundamental and Applied Toxicology, (1988) Vol. 10, No. 4, pp. 624-634.
CODEN: FAATDF. ISSN: 0272-0590.
DOCUMENT TYPE: Article
FILE SEGMENT: BIOSIS
OTHER SOURCE: BIOSIS 1988:358645
LANGUAGE: ENGLISH
ENTRY DATE: Entered STN: 20011116
Last Updated on STN: 20011116

AB Recent data have demonstrated that the in vivo effects of low dosages of two pyrethroids, cismethrin and deltamethrin, can be differentiated. Two behavioral tests, locomotor activity and the acoustic startle response (ASR), were utilized to separate the behavioral actions of Type I and II pyrethroids using permethrin, RU11679, cypermethrin, RU26601, fenvalerate, **cyfluthrin**, flucythrinate, fluvalinate and p,p'-DDT. Dosage-effect functions for all compounds were determined for both figure-eight-maze activity and the ASR in the rat. All compounds were administered po in 1 ml/kg corn oil 1.5-3 hr prior to testing. All compounds produced dosage-dependent decreases in locomotor activity. The Type I compounds, permethrin and RU11679, along with p,p'-DDT, increased amplitude and had no effect on latency to onset of the ASR. In contrast, the Type II pyrethroids, cypermethrin, **cyfluthrin**, and flucythrinate, decreased amplitude and increased the latency to onset of the ASR. Fenvalerate increased the amplitude, had no effect on latency, but unlike the other compounds tested, increased ASR sensitization. Fluvalinate had no effect on any measure of the ASR. These data provide further evidence of the differences between the in vivo effects of low dosages of Type I and II pyrethroids, and extend the findings of our previous work to other representatives of the two classes of pyrethroids.

L85 ANSWER 114 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1989:59052 TOXCENTER
COPYRIGHT: Copyright (c) 2006 The Thomson Corporation
DOCUMENT NUMBER: PREV198987022336
TITLE: ACTION OF PYRETHROIDS ON POTASSIUM-STIMULATED CALCIUM UPTAKE BY AND TRITIATED NIMODIPINE BINDING TO RAT BRAIN SYNAPTOSOMES
AUTHOR(S): RAMADAN A A [Reprint author]; BAKRY N M; MAREI A-S M; ELDEFRAWI A T; ELDEFRAWI M E
CORPORATE SOURCE: DEP PHARMACOL EXP THERAPEUTICS, UNIV MD SCH MED, BALTIMORE, MD 21201, USA
SOURCE: Pesticide Biochemistry and Physiology, (1988) Vol. 32, No. 2, pp. 114-122.
CODEN: PCBPBS. ISSN: 0048-3575.
DOCUMENT TYPE: Article
FILE SEGMENT: BIOSIS
OTHER SOURCE: BIOSIS 1989:34336
LANGUAGE: ENGLISH
ENTRY DATE: Entered STN: 20011116
Last Updated on STN: 20011116

AB The effects of pyrethroids were studied on K+-stimulated 45Ca2+ uptake by rat brain synaptosomes. This uptake had low affinity for the inhibitors of voltage-dependent Ca2+ channels (verapamil, diltiazem, nimodipine, and nifedipine) but was potently inhibited by 2'-4'-dichlorobenzamil (DCB). The characteristics of 45Ca2+ uptake, measured in the absence of any added ATP, suggested that most it was a result of the activity of the Na+-Ca2+ exchanger in these membranes. The pyrethroids were more potent inhibitors of this K+-stimulated 45Ca2+ uptake than even the "specific" inhibitor DCB. The seven type II pyrethroids (containing α-cyano-3- phenoxybenzyl alcohol) tested (with average IC50 of 11 μM) were more potent inhibitors of this 45Ca2+ uptake than the seven type I pyrethroids (which do not contain an α-cyano substituent). Both **toxic** and nontoxic cypermethrin isomers inhibited the 45Ca2+ uptake with similar potencies. Both types of pyrethroids also inhibited voltage-dependent Ca2+ channels in the membrane, which were detected by their specific binding of [3H]nimodipine with the following order of decreasing potencies: pyrethrins > cypermethrin > **cyfluthrin** > deltamethrin = resmethrin > tetramethrin > S-bioallethrin > allethrin = permethrin > flucythrinate > bioallethrin > fenvalerate = fluvalinate » tralomethrin. The relatively low potencies of pyrethroids on the K+-stimulated 45Ca2+ uptake and [3H]nimodipine binding, the poor stereospecificity of pyrethroid action, and the poor correlation with their **toxicities** suggest that neither the Na+-Ca2+ exchanger nor the voltage-dependent Ca2+ channel are primary targets for pyrethroid **toxicity.**

L85 ANSWER 115 OF 122 TOXCENTER COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1989:59051 TOXCENTER
COPYRIGHT: Copyright (c) 2006 The Thomson Corporation
DOCUMENT NUMBER: PREV198987022335
TITLE: ACTIONS OF PYRETHROIDS ON THE PERIPHERAL BENZODIAZEPINE RECEPTOR
AUTHOR(S): RAMADAN A A [Reprint author]; BAKRY N M; MAREI A-S M; ELDEFRAWI A T; ELDEFRAWI M E
CORPORATE SOURCE: DEP PHARMACOL EXP THERAPEUTICS, UNIV MD SCH MED, BALTIMORE, MD 21201, USA
SOURCE: Pesticide Biochemistry and Physiology, (1988) Vol. 32, No. 2, pp. 106-113.
CODEN: PCBPBS. ISSN: 0048-3575.
DOCUMENT TYPE: Article
FILE SEGMENT: BIOSIS
OTHER SOURCE: BIOSIS 1989:34335
LANGUAGE: ENGLISH
ENTRY DATE: Entered STN: 20011116
Last Updated on STN: 20011116

AB The interactions of 14 pyrethroids, as well as 2 permethrin isomers and 8 pure geometric cypermethrin isomers, with the peripheral benzodiazepine (PBZ) receptor of rat brain were studied. This receptor, which is located in the outer membrane of mitochondria, was identified by its specific binding of 3H-labeled 7-chloro-1,3-dihydro-1-methyl-5-(p-chlorophenyl)-2H- 1,4-benzodiazepine-2-one ([3H]Ro5-4864) (Kd 7.5 nM). Pyrethroids that do not contain α-cyano-3-phenoxybenzyl alcohol (i.e., type I), as well as those that generally do (i.e., type II), inhibited the binding with IC50 values ranging from 0.15 to > 100 μM with decreasing potency as follows: deltamethrin > flucythrinate > pyrethrins > cypermethrin = **cyfluthrin** > tetramethrin > allethrin > tralomethrin > bioallethrin = trans-permethrin > S-bioallethrin = resmethrin > fenvalerate = permethrin and cis-permethrin > fluvalinate. Except for fluvalinate, and possibly fenvalerate, type II pyrethroids were in general more potent inhibitors than type I pyrethroids. Of the eight cypermethrin isomers tested at 1 μM, only the 1R,cis,αS inhibited [3H]Ro5-4864 binding, and its potency was unaffected by the nontoxic isomers. It is suggested that pyrethroids bind to the PBZ receptor, which for certain pyrethroids may contribute to their **toxicities**. However, the poor correlation between the potencies of either or both types of pyrethroids as inhibitors of [3H]Ro5-4864 binding and their **toxicities** suggests that the PBZ receptor is not a primary target that is critical for pyrethroid **toxicity**.

L2 ANSWER 1 OF 6 CSNB COPYRIGHT 2006 RSC on STN
AN 25(9):2158 CSNB
TI Twenty-three workers poisoned in California.
SO Pesticides News (2005) (68), 5
ISSN: 0967-6597
DT Journal
LA English
AB Spray drift caused twenty-three women vineyard workers in Arvin, Kern Country, California to be hospitalised on 12 May 2005. A mixture of the pyrethroid Baythroid and the spinosad Success was being applied to fruit trees growing adjacent to the vineyard. All the women received emergency treatment onsite then were treated in hospital for convulsions, breathing problems, nausea and dizziness.

L2 ANSWER 4 OF 6 CSNB COPYRIGHT 2006 RSC on STN
AN 23(7):1926 CSNB
TI Occupational asthma symptoms and respiratory function among aerial pesticide applicators.
AU Jones, S. M.; Burks, A. W.; Spencer, H. J.; Lensing, S.; Roberson, P. K.; Gandy, J.; Helm, R. M. (JonesStacieM@uams.edu, Dept. Pediatrics, Univ. Arkansas Med. Sci., Arkansas, USA)
SO Am. J. Ind. Med. (2003) 43(4), 407-417
CODEN: AJIMD8 ISSN: 0271-3586
DT Journal
LA English
AB Pesticide exposure has been suggested as one causal factor for the rise in asthma prevalence. The goal of this investigation was to determine the effect of pesticide exposure on respiratory symptoms and lung function in workers with occupational exposure to pesticides. A prospective, case-controlled study was conducted among pesticide applicators (AV) and community controls (Con). In Phase I, subjects completed an asthma survey and baseline spirometry. In Phase II, subjects reported symptoms, lung function monitoring, and pesticide exposure during two, 14-day periods. Phase I-Self-reported asthma and symptoms were similar among AV (n = 135) and Con (n = 118) with 4-6% prevalence reported but with higher rates among smokers. Baseline lung function was similar; although, a higher proportion of AV had forced expiratory volume in one second (FEV1) <80% predicted (8% vs. 2%, P = 0.02). Phase II-Self-reported symptoms were similar with 80% of AV (n = 50) and 73% of Con (n = 49) reporting no symptoms. Only 4% of AV and 6% of controls reported increased symptoms from baseline to spray season. Serial lung function did not differ between group and mean diurnal variation in peak expiratory flow improved in both groups between sampling times (AV 18% vs. 14%; Con 19% vs. 16%,

P< 0.001). This study suggests that among workers with occupational pesticide exposure, asthma symptoms and lung function are similar to those of controls with only community-based exposure.

L2 ANSWER 5 OF 6 CSNB COPYRIGHT 2006 RSC on STN
AN 19(6):2166 CSNB
TI Toxicokinetics of pyrethroids in humans: consequences for biological monitoring.
AU Kuhn, K.-H.; Wieseler, B.; Idel, L. H. (Institute Hygiene, Heinrich-Heine Univ. Dusseldorf, 40225 Dusseldorf, Germany)
SO Bull. Environ. Contam. Toxicol. (1999) 62(2), 101-108
CODEN: BECTA6 ISSN: 0007-4861
DT Journal
LA English
AB Two male pest control operators (PCO) provided urine samples at frequent intervals (12-24 h) after work in exposure free time, for up to 4 day, in a study of the cumulative elimination kinetics of two pyrethroids, cypermethrin and cyfluthrin. Total ratios of trans-/cis-3-(2,2- dichloroethenyl)-2,2-dimethylcyclopropane carboxylic acids, metabolites of both pyrethroids were measured in urine samples of 5 PCO. Results were consistent with data obtained from earlier volunteer exposure studies. Cyfluthrin was eliminated slightly more rapidly than cypermethrin and linear regression analysis was adequate for half-life estimations. The findings supported the assumption that the excretion of structurally related pyrethroids from the human body could be described by first order kinetics.

L34 ANSWER 250 OF 261 HEALSAFE COPYRIGHT 2006 CSA on STN
ACCESSION NUMBER: 97:4825 HEALSAFE
TITLE: Biological monitoring of pyrethroids in blood and pyrethroid metabolites in urine: Applications and limitations
AUTHOR: Leng, G.; Kuehn, K.-H.; Idel, H.
CORPORATE SOURCE: Inst. Hyg., Heinrich-Heine Univ. Duesseldorf, Moorenstr. 5, D-40225 Duesseldorf, Germany
SOURCE: Science of the Total Environment, (19970600) pp. 173-181.
Meeting Info.: International Symposium on Biological Monitoring in Occupational and Environmental Health. Espoo (Finland). 11-13 Sep 1996.
ISSN: 0048-9697.
DOCUMENT TYPE: Book
TREATMENT CODE: Conference
FILE SEGMENT: H
LANGUAGE: English
SUMMARY LANGUAGE: English
AB The objective of this study was to perform biological monitoring of subjects who are **occupationally** exposed to pyrethroids. The study group consisted of 30 pest control operators exposed to **cyfluthrin**, cypermethrin or permethrin. After **exposure**, 24-h urine samples were collected and 20 ml of blood was drawn. The pyrethroid metabolites cis- and trans-3-(2,2-dichlorovinyl)-2,2- dimethylcyclopropanecarboxylic acid, 3-phenoxybenzoic acid and fluorophenoxybenzoic acid were determined in the urine samples (limit of detection: 0.5 mu g/l) by GC MS and the pyrethroids in plasma (limit of detection: 5 mu g/l) by GC-ECD. The concentrations of metabolites in the urine of the pest control operators ranged between < 0.5 mu g/l and 277 mu g/l urine. The concentrations of **cyfluthrin**, cypermethrin and permethrin in the plasma were below the limits of detection (<5 mu g /l). To test if the metabolites are specific for pyrethroid **exposure**, they were determined in the urine of non-exposed subjects (n = 40). In no case could pyrethroid metabolites be detected. A **cyfluthrin** elimination experiment showed that **cyfluthrin** metabolites are eliminated following first-order kinetics (t sub(1/2) = 6.4 h). Storage experiments demonstrate that frozen urine samples (-21 degree C) show no significant losses of metabolites within a year. In contrast, pyrethroids stored in plasma are susceptible to further biodegeneration.

L34 ANSWER 258 OF 261 DISSABS COPYRIGHT (C) 2006 ProQuest Information and Learning Company; All Rights Reserved on STN

ACCESSION NUMBER: 1999:20414 DISSABS Order Number: AAR9909504

TITLE: THE TRANSLOCATION OF MICROENCAPSULATED **CYFLUTHRIN** AND DIAZINON FOLLOWING PERIMETER APPLICATIONS TO DWELLINGS (VAPOR PRESSURE, INSECTICIDE **EXPOSURE**)

AUTHOR: STOUT, DANIEL MARVIN, II [PH.D.]; LEIDY, ROSS B. [adviser]; SCHAL, COBY [adviser]

CORPORATE SOURCE: NORTH CAROLINA STATE UNIVERSITY (0155)

SOURCE: Dissertation Abstracts International, (1998) Vol. 59, No. 10B, p. 5217. Order No.: AAR9909504. 115 pages.

DOCUMENT TYPE: Dissertation

FILE SEGMENT: DAI

LANGUAGE: English

AB Insecticide applications to the perimeter of dwellings may result in the translocation of residues from the point of application. Microencapsulated (ME) **cyfluthrin** and diazinon applied to the perimeters of residential dwellings were investigated to determine their routes of movement following field treatments. Objectives included: the clarification of translocation pathways in association with vapor pressures, demonstration of track-in from an exterior source and the assessment of potential residential **exposures.** Out-of-doors, treatments were monitored to determine spray drift and the persistence of soils residues. Monitoring indoors included sampling the ambient air, surfaces and dislodgeable residues from vacuum sweepings. Applications of both ME formulations of **cyfluthrin** and diazinon located the majority of deposits within treatment zones, however low levels of spray drift were measurable at 15.1 m from foundations. Residues recovered from soils declined to ca. half of maximal levels at 30 days post-treatment for both compounds. **Cyfluthrin** was not detected from interior ambient air or on surfaces. Diazinon was recovered from indoor air and surfaces following treatments. Both **cyfluthrin** and diazinon were recovered from vacuum sweepings at initially high levels that declined over time.

Findings suggest that perimeter treatments may result in spray drift outside treated areas which potentially could result in **occupational** and residential **exposure. Cyfluthrin** residues recovered from soils might serve as a persistent source of tranlocatable residues. Vapor pressure appears to influence routes of translocation. **Cyfluthrin** infiltrates indoors primarily by track-in, while diazinon translocates as vapors and by track-in. Residential **exposures** to airborne **cyfluthrin** is not probable, more likely **exposures** more likely occur through **dermal exposure** or ingestion. Conversely, **exposures** to diazinon might result via inhalation of airborne residues or by **dermal** contact and ingestion.