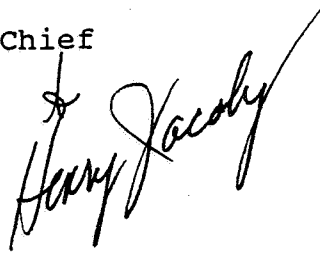


DP Barcode:
PC#: 128993 ✓
Date Out of EFGWB: 6/27/91

TO: Susan Lewis
Product Manager # 21
Registration Division (H7505C)

FROM: Akiva Abramovitch, Ph.D., Chief
Review Section #3
OPP/EFED/EFGWB (H7507C)

THROUGH: Henry Jacoby, Chief
OPP/EFED/EFGWB (H7507C)



Attached, please find the EFGWB review of:

Identifying No.: 055947-RGG, 055947-RGE

Common Name : Cyproconazole

Chemical Name : alpha-(4-Chlorophenyl-alpha-(1-cyclopropylethyl)-
1H-1,2,4-triazole-1-ethanol

Product Type : Fungicide

Product Name : San 619F

Company Name : Sandoz Crop Protection Corporation

Purpose : Review aerobic soil metabolism study and company's
response to adsorption/desorption review

Date Received: 3/28/91 EFGWB #(s): 90-0568-0569, 90-0520-0521

Date Completed: 4/20/91

Total Reviewing Time: 4.0 days

Deferrals to: _____ Ecological Effects Branch/EFED
_____ Science Integration & Policy Staff/EFED
_____ Non-Dietary Exposure Branch/HED
_____ Dietary Exposure Branch/HED
_____ Toxicology Branch I, II/HED

1. CHEMICAL:

Common Name: Cyproconazole

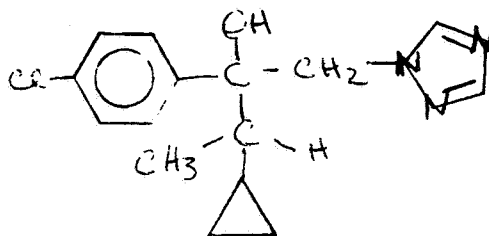
Chemical Name: alpha-(4-Chlorophenyl-alpha-(1-cyclopropylethyl)-1H-1,2,4-triazole-1-ethanol

Type of product: Fungicide

Chemical Structure:

Physical/Chemical Properties

molecular weight: 291.8
aqueous solubility: 140 ppm @ 20°C
vapor pressure: 2.6×10^{-7} torr



2. TEST MATERIAL:

See the attached DER.

3. STUDY/ACTION TYPE: Review aerobic soil metabolism study for cyproconazole technical, cyproconazole 40 WG turf fungicide and review company's response to ad/des review.

4. STUDY IDENTIFICATION:

(1) MRID No: 41441301

Tsun-Min R. Tong, Equilibrium Study for Soil Adsorption/Desorption of SAN 619F, Supplement to MRID # 40607709, Sandoz Crop Protection 1300 East Touhy Avenue, Des Plaines, Illinois 60018

(2) MRID No: 41474401

Tong, T.R., Krueger, J.P., Aerobic Soil Metabolism of SAN 619F (Cyproconazole), April 26, 1990, Sandoz Crop Protection Corporation, Des Plaines, Illinois 60018

5. REVIEWED BY:

Kevin L. Poff, Chemist
Environmental Chemistry Review Section #3
Environmental Fate and Groundwater Branch/EFED

Kevin L. Poff
Date: 6/20/91

6. APPROVED BY:

Akiva Abramovitch, Ph.D., Chemist
Environmental Chemistry Review Section #3
Environmental Fate and Groundwater Branch/EFED

Akiva Abramovitch
Date: JUN 21 1991

7. CONCLUSIONS:

Sandoz response to previous review.

(1) MRID # 41441301

The submitted study 41441301 is acceptable and together with MRID # 40607709 completely satisfies the leaching and adsorption/desorption data requirement (163-1) for cyproconazole.

(2) The submitted data confirmed that the 16 hour time period was sufficient for cyproconazole to obtain soil/water equilibrium with the soils studied in the batch equilibrium study 40607709 of the December 1988 review. From 2 to 25 hours there was no significant change in the slope of the equilibrium curve. K_d at 16 hours was 6.86 in Gilroy loam.

(3) Summary of Data from previously submitted study: MRID 40607709
December 5, 1988 Science Chapter

Column Leaching

(RS,RS)-a-[¹⁴C] cyproconazole applied to the top of a soil column at a rate equivalent to 0.1 kg/ha (0.09 lb/A) was only slightly mobile in Gilroy loam soil. After leaching with 20 inches of water over a 7 day period, 74% of the applied radioactivity remained in the upper 6-cm of the soil column, 94% of the applied radioactivity was retained by the soil column (42-cm length), and less than 1% was determined in the leachate.

Batch Equilibrium

Batch equilibrium experiments were conducted on 5 soils, a Gilroy loam (same as soil column leaching) with an organic matter (OM) of 2.3%, pH of 6.4 and CEC 25.7; a Gilroy sediment (OM) 2.3%, pH 7.4, CEC 16.1; a Keaton sandy loam, (OM) 1.3, pH 7.0, CEC 14.1; a Biggs clay (OM) 11.4%, pH 6.2, CEC 33.0; a German loamy sand (OM) 3.9%, pH 5.1, CEC 11.1; a Monterey sand (OM) 0.0%, pH 6.7, CEC 2.2. K_d values were not calculated. The first % desorption values reported below are from the highest cyproconazole concentration used in the experiment (62.5 g/g), the second value is from the lowest at 0.1 g/g.

	K_{ads}	% desorption		% organic matter
		(62.5 g/g)	(0.1 g/g)	
Gilroy loam ($K_d=6.86$)	4.1	30.9,	15.9	2.3
Gilroy sediment	4.9	26.8,	13.5	2.3
Keaton sandy loam	1.3	60.4,	35.4	1.3
Biggs clay	17	10.9,	2.04	11.4
German loamy sand	16	8.9,	5.21	3.9
Monterey sand	too little to calculate			0.0

162-1 Aerobic Soil Metabolism:

(1) This study is acceptable and fulfills the aerobic soil metabolism (162-1) data requirement for cyproconazole.

(2) Cyproconazole degraded very slowly in a loamy sand soil under aerobic conditions with a calculated half-life of >693 days. After 365 days incubation at $25 \pm 1^\circ \text{C}$, the two diastereomers of cyproconazole accounted for 90% of the applied radioactivity. The only metabolite identified was triazolyl alanine (2-amino-3-(1-H1, 1, 2, 4-triazol-1-yl) propanoic acid (0.6% of applied radioactivity at day 365).

8. RECOMMENDATIONS:

Inform the registrant that the leaching and adsorption/desorption and the aerobic soil metabolism data requirement has been completely satisfied.

Based upon data from acceptable studies cyproconazole has the following characteristics in common with those pesticides that are known to leach into ground water.

(1) A water solubility > 30 ppm (cyproconazole has a water solubility of 140 ppm)

(2) A Henry's constant < $10^{-2} \text{ atm}\cdot\text{m}^3/\text{mol}$ (cyproconazole has a Henry's constant of $7.1 \times 10^{-10} \text{ atm}\cdot\text{m}^3/\text{mol}$)

(3) Stability to hydrolysis

(4) Photodegradative half-life > 1 week (cyproconazole is stable to photodegradation in water and has a photodegradative half-life of > 37 days on a loam soil.

(5) Aerobic half-life > 2-3 weeks (cyproconazole has an aerobic half-life of > 1.5 years)

(6) Also cyproconazole is moderately mobile in soils of low organic matter content.

However, data from acceptable studies indicate that cyproconazole is not readily susceptible to leaching over periods of less than 14 months. For instance, in the leaching and adsorption/desorption 94% of the applied material at 0.09 lb/A was retained by the soil column (74% in the upper 6-cm) and < 1.0% was determined in the leachate. Supplemental information from a terrestrial field dissipation (EFGWB #'s 90-0388/0389, 90-0557, 91-0448/0449) study reported cyproconazole was detected at very low concentrations (at level of detection) at the 10-20 cm depth immediately after application, was not detected at depths greater than 30 cm in the bareground field studies and at the limit of detection in the turf studies. Residues in the turf studies ranged

from 0.01-0.07 at the 20-30 cm depth and may be due to contamination during sampling. Cyproconazole was not detected at depths below 30 cm 14 months after first application.

The data indicate that cyproconazole may pose risks to ground water due mainly to its persistency. Therefore the long term terrestrial field dissipation data requirement (164-5) are required and the ground water monitoring studies should remain in reserve pending the review of acceptable data on the long term terrestrial field dissipation on turf.

The current status of environmental fate data requirements to support the registration of cyproconazole for use on turf is as follows:

(1) Satisfied

- 161-1. Hydrolysis (MRID # 40607706) Stable to hydrolysis.
- 161-2. Photodegradation in Water (MRID # 40607707) Stable
- 161-3. Photodegradation on Soil (MRID # 40607707) Half-life > 37 days
- 162-1. Aerobic Soil Metabolism (MRID # 41474401) Half-life >693 days.
- 163-1. Leaching and Adsorption/Desorption (MRID # 40607709, 74% of applied radioactivity remained in the top 6-cm of the Gilroy loam after 20 inches of water passed through column; K_{ads} were Gilroy loam 4.1, Gilroy sediment 4.9, Keaton sandy loam 1.3, Biggs clay 17, German loamy sand 16, and MRID # 41441301 (this report) reported K_d value in Gilroy loam of 6.86)
- 165-4. Laboratory accumulation in fish (MRID # 40624302, 40624303) Edible 15X, Non-edible 59X, Whole 34X after exposure to 0.24-0.30 ppm for 28 days

(2) Not Satisfied:

- 164-5. Long Term Terrestrial Field Dissipation

(3) Reserved;

Ground Water Monitoring

9. BACKGROUND :

Cyproconazole a is systemic fungicide currently proposed for use only on golf course and sod farm turf.

10. DISCUSSION:

See attached DER.

11. COMPLETION OF ONE-LINER:

Attached.

12. CBI INDEX:

Not applicable.

DATA EVALUATION RECORD

SHAUGHNESSY No. 128993

COMMON NAME: Cyproconazole

CHEMICAL NAME: alpha-(4-Chlorophenyl-alpha-(1-cyclopropylethyl)-
1H-1,2,4-triazole-1-ethanol

FORMULATION: Wettable Dispersible Granule 40%

DATA REQUIREMENT: Aerobic Soil Metabolism (162-1)

MRID No: 41474401

Tong, T.R., Krueger, J.P., Aerobic Soil Metabolism of SAN 619F
(Cyproconazole), April 26, 1990, Sandoz Crop Protection
Corporation, Des Plaines, Illinois 60018

REVIEWED BY: Kevin L. Poff
Chemist EFGWB/EFED

Signature: *Kevin Poff*

Date: 6/20/91

APPROVED BY: Akiva Abramovitch, Ph.D.
Chemist EFGWB/EFED

Signature: *Akiva Abramovitch*

Date:

JUN 21 1991

CONCLUSIONS:

(1) This study is acceptable and fulfills the aerobic soil metabolism (162-1) data requirement for cyproconazole.

(2) Cyproconazole degraded very slowly in a loamy sand soil under aerobic conditions with a calculated half-life of >693 days. After 365 days incubation at 25 ± 1° C, the two diastereomers of cyproconazole accounted for 90% of the applied radioactivity. The only metabolite identified was triazolyl alanine (2-amino-3-(1-H1, 1, 2, 4-triazol-1-yl) propanoic acid (0.6% of applied radioactivity at day 365).

MATERIALS AND METHODS:

¹⁴C-SAN 619 (alpha-¹⁴C), specific activity 54.9 mC/mmole, 98.11% purity was mixed with unlabeled analytical standard (purity unspecified) and was dissolved in deionized water (resulting activity 155,144 DPM/ug) and applied to a North Carolina loamy sand (sieved 2mm), 84% sand, 10% silt, 6% clay, 1.1% organic matter, pH 7.32, CEC 2.0 meq/100g, 7.32% moisture capacity at 0.33 bar at 1 g/g soil, = 1 lb/acre (actual concentration was 0.86 g/g). Normal application rate is 0.38 lbs/acre. Soils were brought to 75% of the 0.33 bar and incubated at 25°C in the dark. Soils were sampled at 0, 1, 3, 7, 14 days and 1, 2, 3, 4, 6, 9, and 12 months. Organic volatiles and CO₂ were trapped by ethylene glycol and 1.5N NaOH respectively. Soil samples were frozen at -20°C immediately after collection. Volatiles were radioassayed by LSC, residues were analyzed by TLC, GC-MS and total radioactivity by combustion.

RESULTS:

Table 1 shows the structures of the parent and analytical standards, table III shows the R_f values of ¹⁴C-SAN 619F and the reference standards, tables IV through IX shows total radiocarbon and characterization of extracts, table X is the data used to generate the half-life calculations. Figure 3 shows the dissipation curve of the parent (conc. vs time).

1. ¹⁴C-619F under aerobic conditions degraded with a calculated half-life of >693 days. Parent compound accounted for > 90% of recovered radioactivity at all sampling times.
2. Bound residues were approximately 10% of applied activity.
3. Volatile products were present in very small amounts (CO₂ 0.035 ppm, organic volatiles 0.003 ppm)
4. Material balance averaged 96.9% with a range of 92-107%.

DISCUSSION:

(1) EFGWB recommends that when using an analytical standard the purity of that standard should be stated in the report.

(2) This study is acceptable and fulfills the requirements of the Environmental Protection Agency Pesticide Assessment Guide lines, Subdivision N, Section 162-1 on aerobic soil metabolism.

RIN 0655-94

CYPROCONAZOLE REVIEWS

Page _____ is not included in this copy.

Pages 8 through 21 are not included.

The material not included contains the following type of information:

- Identity of product inert ingredients.
 - Identity of product impurities.
 - Description of the product manufacturing process.
 - Description of quality control procedures.
 - Identity of the source of product ingredients.
 - Sales or other commercial/financial information.
 - A draft product label.
 - The product confidential statement of formula.
 - Information about a pending registration action.
 - FIFRA registration data.
 - The document is a duplicate of page(s) _____.
 - The document is not responsive to the request.
-

The information not included is generally considered confidential by product registrants. If you have any questions, please contact the individual who prepared the response to your request.

Environmental Fate & Effects Division
 PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
 CYPROCONAZOLE

Last Update on June 14, 1991

[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

LOGOUT	Reviewer:	Section Head:	Date:
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Common Name: CYPROCONAZOLE

Smiles Code:

PC Code # : 128993

CAS #: 94361-06-5

Caswell #:

Chem. Name : (α -(4-CHLOROPHENYL)- α -(1-CYCLOPROPYLETHYL)-1H-1,2,4-TRIAZOLE-1-ETHANOL

Action Type: FUNGICIDE

Trade Names: SAN 619 F

(Formul'tn): WETTABLE DISPERSABLE GRANULE 40%

Physical State:

Use : TURF
 Patterns :
 (% Usage) :
 :

Empirical Form: $C_{15}H_{18}N_3O$
 Molecular Wgt.: 291.77 Vapor Pressure: 2.60E -7 Torr
 Melting Point : °C Boiling Point: °C
 Log Kow : pKa: @ °C
 Henry's : 7.10E-10 Atm. M3/Mol (Measured) 7.13E-10 (calc'd)

Solubility in ...					Comments
Water	1.40E	2	ppm	@25.0 °C	
Acetone	E		ppm	@ °C	
Acetonitrile	E		ppm	@ °C	
Benzene	E		ppm	@ °C	
Chloroform	E		ppm	@ °C	
Ethanol	E		ppm	@ °C	
Methanol	E		ppm	@ °C	
Toluene	E		ppm	@ °C	
Xylene	E		ppm	@ °C	
	E		ppm	@ °C	
	E		ppm	@ °C	

Hydrolysis (161-1)

[V] pH 5.0: STABLE 14 DAYS 80C
 [V] pH 7.0: STABLE 14 DAYS 80C
 [V] pH 9.0: STABLE 14 DAYS 80C
 [] pH :
 [] pH :
 [] pH :

22

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
CYPROCONAZOLE

Last Update on June 14, 1991

[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Photolysis (161-2, -3, -4)

[] Air :
[V] Soil :>37 DAYS ON LOAM;SUNLIGHT
[V] Water:STABLE 40 DAYS IN SUNLIGHT
[] :FOR 8-10 HRS/DAY
[] :
[] :

Aerobic Soil Metabolism (162-1)

[S] >1.5 YR VARIOUS SOILS .
[V] > 693 days, loamy sand
[]
[]
[]
[]
[]

Anaerobic Soil Metabolism (162-2)

[]
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Anaerobic Aquatic Metabolism (162-3)

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Aerobic Aquatic Metabolism (162-4)

[]
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Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
CYPROCONAZOLE

Last Update on June 14, 1991

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Soil Partition Coefficient (Kd=6.86) (163-1)

[V] In 5 soils ranging from sand to clay, organic matter from 0.0% to
[] 11.4%, pH 5.1 to 7.4, K(ads) and 1/N values ranged from 1.3 to 17
[] and 0.84 to 0.90 respectively.
[] Kd=6.86 in Gilroy loam
[]
[]

Soil Rf Factors (163-1)

[V] IN AN ELUTION OF 42 CM LOAM,
[] WITH 20" OF WATER IN 7 DAYS,
[] <1% WAS IN THE LEACHATE AND
[] 74% WAS IN TOP 6 CM
[]
[]

Laboratory Volatility (163-2)

[]
[]

Field Volatility (163-3)

[]
[]

Terrestrial Field Dissipation (164-1)

[S] NON-DETECTABLE RESIDUES IN SOIL UNDER GRAPE VINES TREATED
[] 4 TIMES AT 21 DAY INTERVALS, 5 G AIA.
[S] 4 applications at 14 day intervals (0.381 lb/A) at 0-10cm depth
[] max. con. reached 1.58 ppm on day 14 after the last application
[] and declined to 0.33 ppm on day 350 after the last application.
[] Calc. Half-life= 192 days.
[]
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[]
[]

Aquatic Dissipation (164-2)

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[]
[]
[]
[]

Forestry Dissipation (164-3)

[]
[]

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
CYPROCONAZOLE

Last Update on June 14, 1991

[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Long-Term Soil Dissipation (164-5)

[]
[]

Accumulation in Rotational Crops, Confined (165-1)

[]
[]

Accumulation in Rotational Crops, Field (165-2)

[]
[]

Accumulation in Irrigated Crops (165-3)

[]
[]

Bioaccumulation in Fish (165-4)

[V] BLUEGILL SUNFISH BCF AFTER EXPOSURE TO .24-.30 PPM FOR
[] 28 DAYS: EDIBLE 15 X; NONEDIBLE 59 X; WHOLE 34 X

Bioaccumulation in Non-Target Organisms (165-5)

[]
[]

Ground Water Monitoring, Prospective (166-1)

[]
[]
[]
[]

Ground Water Monitoring, Small Scale Retrospective (166-2)

[]
[]
[]
[]

Ground Water Monitoring, Large Scale Retrospective (166-3)

[]
[]
[]
[]

Ground Water Monitoring, Miscellaneous Data (158.75)

[]
[]
[]

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
CYPROCONAZOLE

Last Update on June 14, 1991

[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Field Runoff (167-1)

[]
[]
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[]

Surface Water Monitoring (167-2)

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[]

Spray Drift, Droplet Spectrum (201-1)

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Spray Drift, Field Evaluation (202-1)

[]
[]
[]
[]

Degradation Products

p-chlorobenzoic acid (photodeg.)
3-(4-chlorophenyl)-2-cyclopropyl-1-(1H-1,2,4-triazol-1-yl)-
1,3-butanediol (fish)
triazolyl alanine (2-amino-3-(1-H1,1,2,4-triazol-1-yl) propanoic
acid (aerobic soil metabolism)

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
CYPROCONAZOLE

Last Update on June 14, 1991

[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Comments

Limited data indicate that cyproconazole is not readily susceptible to leaching over periods of less than 14 months.

References: EAB REVIEWS
Writer : HN, KLP