

Data Evaluation Report on the terrestrial field dissipation of prothioconazole

PMRA Submission Number N/A

EPA MRID Number 46246518

Data Requirement: PMRA Data Code: 8.3.2
EPA DP Barcode: D303488
OECD Data Point:
EPA Guideline: 164-1

Test material: JAU6476

End Use Product name: JAU6476 250 SC **Concentration of a.i.:** 252 g a.i./L
Formulation type: Soluble concentrate

Active ingredient

Common name: Prothioconazole.

Chemical name:

IUPAC: (RS)-2-[2-(1-Chlorocyclopropyl)-3-(2-chlorophenyl)-2-hydroxypropyl]-2,4-dihydro-3H-1,2,4-triazole-3-thione.

CAS name: 2-[2-(1-Chlorocyclopropyl)-3-(2-chlorophenyl)-2-hydroxypropyl]-1,2-dihydro-3H-1,2,4-triazole-3-thione.

CAS No: 178928-70-6.

Synonyms: JAU6476.

SMILES string: C1C(C(Cc2ccccc2Cl)(CN2N=CNC2=S)O)CC1.

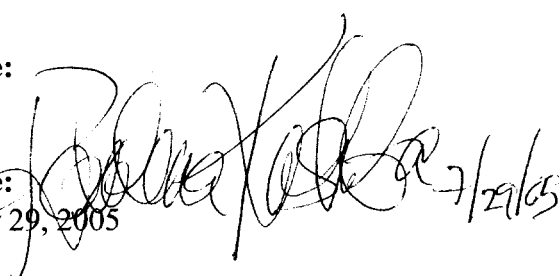
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Date: July 29, 2005

Company Code:
Active Code:
Use Site Category:
EPA PC Code: 113961

CITATION: Wood, S.E. 2004. Terrestrial field dissipation of JAU6476 in Georgia soil, 1999. Unpublished study performed by A & L Great Lakes Laboratories, Inc., Fort Wayne, IN, Bayer CropScience, Stilwell, KS and Bayer CropScience, Tifton, GA and submitted by Bayer CropScience, Research Triangle Park, NC. Submitting Laboratory Study No. J6022101. Bayer Report No. 110799. Experiment initiation May 19, 1999, and completion November 15, 2000 (field phase; p. 13). Final report issued January 28, 2004.



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Date: 10-27-2004

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Date: 10/27/04

Secondary Reviewer: John Ravenscroft
EPA

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EXECUTIVE SUMMARY:

Soil dissipation/accumulation of prothioconazole ((RS)-2-[2-(1-chlorocyclopropyl)-3-(2-chlorophenyl)-2-hydroxypropyl]-2,4-dihydro-3H-1,2,4-triazole-3-thione; JAU6476) under US field conditions was conducted in a bare plot of loamy sand/sandy loam soil near Byromville, Georgia (ecoregion not reported). The experiment was carried out in accordance with USEPA Subdivision N Guideline §164-1 and in compliance with the USEPA GLP standards.

Prothioconazole was sprayed twice (14 days apart) at a target application rate of 0.441 kg a.i./ha/application (6.3 oz a.i./A/application; 0.882 kg a.i./ha/season) in a test plot measuring 30 x 31 m (100 x 102 ft.). The test substance was applied at 110% of the proposed label rate. Rainfall was supplemented with irrigation to reach 154% of the historical average rainfall for the same time period. A control plot was located approximately 76 m away from the treated plot.

The application rate was verified for both applications using solvent saturation pads (13.7 x 22 cm) and soil pans (12-in diameter) that were placed in all five sections of the treated plot. Mean recoveries of prothioconazole from the soil pads were 98% and 85% of the applied amount (6.3 oz. a.i./A) (108% and 94% of the label rate (5.72 oz. a.i./A)) for the first and second applications, respectively. Corresponding recoveries from the soil pans were 75% and 82% of the applied amount (83% and 90% of the label rate) for the first and second applications, respectively. Field spikes were prepared for the transformation products JAU6476-desthio, JAU6476-S-methyl, and 1,2,4-triazole in duplicate at 50 µg/kg. Recoveries from field spikes were 82-83% for JAU6476-desthio, 85-86% for JAU6476-S-methyl, and 67-70% for 1,2,4-triazole following 1211-1221 days of storage. Field spikes were not prepared for prothioconazole and the transformation product JAU6476 thiazocine.

Soil samples were taken following both applications (at -14 days and 0 days) and at 2, 7, 14, 28, 61, 90, 120, 141, 218, 296, 306, 421, and 532 days after the second application to a depth of 0-120 cm (except application 1, day 0 (at -14 days) samples, which were collected to a depth of 15 cm). Soil samples were extracted with acetonitrile:water:cysteine hydrochloride (800:200:0.5, v:v:w) and analyzed for prothioconazole and the transformation products **JAU6476-desthio** (2-[2-(1-chlorocyclopropyl)-3-(2-chlorophenyl)-2-hydroxypropyl]-1,2-dihydro-3H-1,2,4-triazole), **JAU6476-S-methyl** (alpha-1(1-chlorocyclopropyl)-alpha-[(2-chlorophenyl)methyl]-3-(methylthio)-1H-1,2,4-triazole-1-ethanol), and **JAU6476 thiazocine** (6-(1-chlorocyclopropyl)-6,7-dihydro-triazole-5H-[1,2,4]triazolo[5,1-b][1,3]benzothiazon-6-ol) by LC/MS/MS. Separate soil samples were extracted by sonicating with acetonitrile:water (6:4, v:v) and analyzed for **1,2,4-triazole** (1-H-1,2,4-triazole) by LC/MS/MS detection following derivatization to dansyl 1,2,4-triazole. Soil samples were stored for up to 1114 days for the analysis of prothioconazole, JAU6476-desthio, JAU6476-S-methyl, and JAU6476 thiazocine, and up to 718 days for the analysis of 1,2,4-triazole. The LOQ was 10 µg/kg for all compounds in soil. The MDLs were 2.5, 2.7, 1.2, 1.8, and 1.3 µg/kg for prothioconazole, -desthio, -S-methyl, -thiazocine, and 1,2,4-triazole, respectively.

The mean concentration of prothioconazole in the 0-15 cm soil depth following the first application (at -14 days) was 57.5 µg/kg, which is 29.8 % of the theoretical applied concentration, 193.1µg/kg (32.8% of the theoretical concentration if applied at label rate, 175.4

Data Evaluation Report on the terrestrial field dissipation of prothioconazole

PMRA Submission Number N/A

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µg/kg). Following the second application, prothioconazole was detected in the 0-15 cm soil depth at a mean concentration of 61.5 µg/kg at day 0 and decreased to <LOQ by 2 days posttreatment. Prothioconazole was not detected below the 0-15 cm soil depth. The only major transformation product detected at the test site was JAU6476-desthio. JAU6476-desthio was initially detected in the 0-15 cm soil depth at a mean of 44.4 µg/kg immediately following the first application (which is 25.3% of the applied prothioconazole based on one application, after converting to parent equivalents). JAU6476-desthio was a maximum mean concentration of 82.0 µg/kg following the second application (which is 23.4% of the applied prothioconazole based on two applications, after converting to parent equivalents), decreased to a mean of 22.1 µg/kg (6.3% of applied parent) by 61 days post second application, and was last detected above the LOQ at 15.1 µg/kg (single replicate) at 218 days post second application. JAU6476-desthio was not detected at a mean concentration above the LOQ in soil below the 0-15 cm depth. Two minor transformation products, JAU6476-S-methyl and 1,2,4-triazole, were detected at mean concentrations below the LOQ but above the MDL in the 0-15 cm and 0-45 cm soil depths, respectively. JAU6476-S-methyl was first detected in the 0-15 cm soil depth at a mean concentration of 7.2 µg/kg (1.8% of applied parent) at 0 days, then increased to a maximum mean concentration of 10.1 µg/kg (2.5% of applied parent) by 7 days post second application, then decreased to 2.1 µg/kg (0.5% of applied parent) by 61 days post second application, and was <MDL at 120 and from 218 days post second application to the end of the study (532 days post sixth application). JAU6476-S-methyl was not detected above the MDL below the 0-15 cm soil depth. 1,2,4-triazole was not detected above the LOQ at any sampling interval, but was detected above the MDL throughout the 0-45 cm soil depths in a range of 1.3-9.6 µg/kg (1.7-12.4 % of applied parent) in single replicates, with a maximum mean concentration of 4.9 µg/kg (6.3% of applied parent) at 120 days post second application in the 0-15 cm soil depth. JAU6576-thiazocine was not detected above the MDL in any sampling interval at any depth.

Under field conditions at the test site, prothioconazole had a half-life value of 4.7 days ($r^2 = 0.3470$), calculated using linear regression on log-transformed data, based on residues in the 0-15 cm soil depth. The observed DT50 value was <2 days. An observed DT90 value occurred at <2 days, as well. At the end of the study period, 532 days after the second application, the total carryover of the parent and transformation products was 0% and <1% of the total applied prothioconazole (based on two applications), respectively. The half-life for JAU6476-desthio was 96.3 days, calculated using linear regression on log-transformed data. Observed DT50 and DT90 for JAU6476-desthio were 28-61 and 120-296 days, respectively.

The major route of dissipation of prothioconazole under terrestrial field conditions at the test site was transformation.

RESULTS SYNOPSIS

Location/soil type: Byromville, Georgia/Loamy sand-sandy loam (0-180 cm) soil.

Prothioconazole half-life (DT50, observed): <2 days.

Prothioconazole half-life ($t_{1/2}$, calculated): 4.7 days.

Prothioconazole DT90 (observed): <2 days.

Major transformation products detected: JAU6476-desthio.

Data Evaluation Report on the terrestrial field dissipation of prothioconazole

PMRA Submission Number N/A

EPA MRID Number 46246518

Minor transformation products detected: JAU6476-S-methyl, and 1,2,4-triazole.

Dissipation routes: Transformation.

JAU6476-desthio half-life (DT50, observed): 28-61 days.

JAU6476-desthio half-life ($t_{1/2}$, calculated): 96.3 days.

JAU6476-desthio DT90 (observed): 120-296 days.

JAU6476-S-methyl half-life (DT50, observed): 21 days.

JAU6476-S-methyl half-life ($t_{1/2}$, calculated): 41.3 days.

JAU6476-S-methyl DT90 (observed): not reportable (DT90 < MDL).

Study Acceptability: This study is classified **supplemental** for a terrestrial field dissipation study because prothioconazole was not stable in frozen storage.

I. MATERIALS AND METHODS

GUIDELINE FOLLOWED: The study was conducted according to USEPA Pesticide Assessment Guidelines Subdivision N, 164-1 (p. 1). There was one deviation from EPA Subdivision N, 164-1, and it did not affect the validity of the study.

The laboratory storage stability study was inadequate to demonstrate stability of any of the analytes during storage because samples were not analyzed at time 0 to determine initial recoveries, and sampling intervals were inadequate to determine stability of the analytes over time.

COMPLIANCE: The study was conducted in compliance with USEPA FIFRA (40 CRF Part 160) Good Laboratory Practice standards (p. 3). Signed and dated GLP Compliance, Quality Assurance, Data Confidentiality, and Certification of Authenticity statements were provided (pp. 2-5).

A. MATERIALS:

1. Test Material Prothioconazole (JAU6476; p. 12).

Chemical Structure of the active ingredient(s): See DER Attachment 1.

Description: Clear to slightly beige solid (Table 1, p. 29).

Storage conditions of test chemicals: Ambient (p. 14).

Physico-chemical properties of the active ingredient(s): Prothioconazole

Parameter	Values	Comments
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Data Evaluation Report on the terrestrial field dissipation of prothioconazole

PMRA Submission Number {.....}

EPA MRID Number 46246518

Parameter	Values	Comments
Chemical Formula	C ₁₄ H ₁₅ Cl ₂ N ₃ OS	
Molecular weight	344.27	
Water solubility	pH 4 = 5 mg/L; pH 8 = 300 mg/L; pH 9 = 2000 mg/L	
Vapour pressure/volatility	Not reported	
UV absorption	Not reported	
pKa	Not reported	
K _{ow} /log K _{ow}	Unbuffered: Kow = 11300; Log Kow = 4.05 pH 4: Kow = 14600; Log Kow = 4.16 pH 7: Kow = 6600; Log Kow = 3.82 pH 9: Kow = 100; Log Kow = 2.00	
Stability of Compound at room temperature	Not reported	

Data were obtained from Table 1, p. 29 of the study report.

2. Test site: The test site was located near Byromville, Georgia, in a region representative of peanut production in the United States (p. 13; Figures 2-3, pp. 53-54). The soil at the test site was classified as a Lucy loamy sand and consisted of loamy sand from 0 to 45 cm and 75-180 cm and of sandy loam from 45 to 75 cm (Table 3, p. 31). Treflan, Temik, Roundup, Asana, Ammo, Sonalan, Starfire, and Bravo had been applied to the plot in the previous four years (Table 2, p. 30).

Table 1: Geographic location, site description and climatic data at the study site.

Details		Test site
Geographic coordinates	Latitude	N 32.10.6'
	Longitude	W 83.55.0'
	Province/State	Georgia
	Country	US
	Ecoregion	Not reported
Slope Gradient		<1%
Depth to ground water (m)		>3 m
Distance from weather station used for climatic measurements		Weather data were recorded on-site and from weather stations located half a mile and 20 miles from the test site.
Indicate whether the meteorological conditions before starting or during the		Total water input (precipitation plus irrigation) during the study period was 112.15 inches or 154.4% of the historical average

Data Evaluation Report on the terrestrial field dissipation of prothioconazole

PMRA Submission Number {.....}

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Details	Test site
study were within 30 year normal levels (Yes/No). If no, provide details.	precipitation for the same period.

Data were obtained from pp. 13, 16 and 24, and Table 5, p. 33 of the study report.

Table 2: Site usage and management history for the previous three years.

Use	Year	Test site
Crops grown	Previous year	Cotton
	2 years previous	Cotton
	3 years previous	Cotton
Pesticides used	Previous year	Treflan, Temik, Roundup, Asana, and Ammo
	2 years previous	Treflan, Temik, Roundup, Asana, and Ammo
	3 years previous	Treflan, Temik, Roundup, Asana, and Ammo
Fertilizers used	Previous year	Not reported
	2 years previous	Not reported
	3 years previous	Not reported
Cultivation methods, if provided (eg., tillage)	Previous year	Not reported
	2 years previous	Not reported
	3 years previous	Not reported

Data were obtained from Table 2, p. 30 of the study report.

3. Soils:

Table 3: Properties of the soil from the test site (Lucy soil series).

Property	Depth (cm)									
	0-15	15-30	30-45	45-60	60-75	75-90	90-105	105-120	120-150	150-180
Textural classification	LS	LS	LS	SL	SL	LS	LS	LS	LS	LS
% sand	86.4	84.4	82.4	82.4	82.4	84.4	84.4	86.4	86.4	84.4
% silt	6.0	6.0	6.0	4.0	4.0	4.0	4.0	2.0	4.0	4.0
% clay	7.6	9.6	11.6	13.6	13.6	11.6	11.6	11.6	9.6	11.6
pH	6.2	6.1	6.3	6.0	5.5	5.4	5.3	5.1	5.1	5.0
Total organic matter (%)	1.10	0.63	0.26	0.21	0.21	0.05	0.21	<0.05	0.10	0.10

Data Evaluation Report on the terrestrial field dissipation of prothioconazole

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EPA MRID Number 46246518

Property	Depth (cm)									
	0-15	15-30	30-45	45-60	60-75	75-90	90-105	105-120	120-150	150-180
CEC (meq/100 g)	2.72	3.12	1.70	1.91	2.63	1.93	1.37	3.10	1.30	1.03
Bulk density (g/cm ³)	1.51	1.59	1.52	1.56	1.55	1.50	1.46	1.52	1.53	1.53
Moisture at 1/3 atm (%)	5.46	7.37	8.73	8.88	11.86	9.71	7.49	7.93	8.57	7.99
Taxonomic classification (e.g., ferro-humic podzol)	Loamy, siliceous, thermic Arenic Kandiodults									
Soil mapping unit	Not reported									

Data were obtained from Table 3, p. 31 of the study report. LS = Loamy sand, SL = Sandy loam.

B. EXPERIMENTAL DESIGN:

1. Experimental design:

Table 4: Experimental design.

Details		Test site
Duration of study		546 days (532 days following the last application)
Uncropped (bare) or cropped		Bare
Control used (Yes/No)		Yes
No. of replications	Controls	One
	Treatments	One
Plot size (L x W m)	Control	Not reported
	Treatment	30.4 x 31.1 m, divided into five equal sections for sampling.
Distance between control plot and treated plot		76 m
Distance between treated plots		Not reported
Application rate(s) used (g a.i./ha)		441 g a.i./ha/application (6.3 ounces a.i./A/application)
Was the maximum label rate per ha used in study? (Yes/No)		The application rate was 110% of a 5.72 ounces a.i./A proposed label rate, applied 2 times. The 480SC label has a maximum proposed label rate of 2.85 ounces a.i./A, applied four times.
Number of applications		Two

Data Evaluation Report on the terrestrial field dissipation of prothioconazole

PMRA Submission Number {.....}

EPA MRID Number 46246518

Details		Test site	
Application Date(s) (dd mm yyyy)	Application 1	19/05/1999	
	Application 2	02/06/1999	
For multiple applications, application rate at Day 0 and at each application time (mg a.i./kg soil) ¹		0.175 mg a.i./kg	
Application method (eg., spraying, broadcast etc.)		Broadcast spray	
Type of spray equipment, if used		A custom built sprayer with a hydraulic pump was equipped with 12 T-Jet 8003 flat fan nozzles (spaced 18 inches apart and set 17.5 inches above the ground).	
Total volume of spray solution applied/plot OR total amount broadcasted/plot		29.4 gal/A and 29.5 gal/A for the first and second applications, respectively.	
Identification and volume of carrier (e.g., water), if used		Water	
Name and concentration of co-solvents, adjuvants and/or surfactants, if used		None	
Indicate whether the following monthly reports were submitted:			
Precipitation		Yes	
Average minimum and maximum air temperature		Yes	
Average minimum and maximum soil temperature		Yes (2-inch depth)	
Average annual frost-free periods		No (number of frost days per month was reported)	
Indicate whether the Pan evaporation data were submitted		Date were submitted for January 2000-December 2000 only.	
Meteorological conditions during application	Application	1	2
	Cloud cover	10%	80%
	Temperature (°C)	22.2	20
	Humidity	Not reported	Not reported
	Wind speed and direction	1-2 mph, NE	0-3 mph, S
	Sunlight (hr)	Not reported	Not reported
Pesticides used during study:			
name of product/a.i concentration:		Roundup	
amount applied:		Two applications at 2 lb a.i./A	
application method:		Not reported	
name of product/a.i concentration:		Roundup Ultra	
amount applied:		One application at 1 qt/A	
application method:		Not reported	

Data Evaluation Report on the terrestrial field dissipation of prothioconazole

PMRA Submission Number {.....}

EPA MRID Number 46246518

Details	Test site
Supplemental irrigation used (Yes/No) If yes, provide the following details: No. of irrigation: Interval between irrigation: Amount of water added each time: Method of irrigation:	Yes; however, daily irrigation events were not reported. Monthly irrigation totals ranged from 0 to 4.92 inches. Irrigation was supplied by a central-pivot system.
Indicate whether water received through rainfall + irrigation equals the 30 year average rainfall (Yes/No)	Total water input was 154.4% of the historical average for the same time period.
Were the application concentrations verified? (Briefly describe in Section 2 [*] , if used)	Yes
Were field spikes used? (Briefly describe in Section 3 [†] , if used)	Yes
Good agricultural practices followed (Yes or No)	Not reported
Indicate if any abnormal climatic events occurred during the study (eg., drought, heavy rainfall, flooding, storm etc.)	None
If cropped plots are used, provide the following details: Plant - Common name/variety: Details of planting: Crop maintenance (eg., fertilizers used):	N/A
Volatilization included in the study (Yes/No) (if included, describe in Section 4 [§])	No
Leaching included in the study (Yes/No) (if included, describe in Section 5 [‡])	Yes
Run off included in the study (Yes/No) (if included, describe in Section 6 [¶])	No

Data were obtained from pp. 13-16; Tables 4-6, pp. 32-34; Figure 4, p. 55; and Appendix 2, pp. 89-105 of the study report.

The treated plot was cultivated prior to application using a harrow (p. 13).

[†] The application rate at day 0, reported as mg a.i./kg soil, was calculated based on the site-specific bulk density of the 0-15 cm soil depth (1.5 g/cm³) and the application rate of 6.3 oz a.i./A (p. 26).

2. Application Verification: The application rate was verified for both applications using solvent saturation pads and soil pans (pp. 14-15). Two solvent saturation pads (13.7 x 22 cm) were placed in each of the five sections of the test plot immediately prior to each application (10 pads total for each application). Following each application, the two pads from each section of the plot were collected and placed together in a plastic bag (one bag for each section). The pads

Data Evaluation Report on the terrestrial field dissipation of prothioconazole

PMRA Submission Number {.....}

EPA MRID Number 46246518

were extracted three times by shaking for 30 minutes, once with 100 mL 0.01% L-cysteine hydrochloride and 100 mL of acetonitrile, and twice with 160 mL of acetonitrile:water (1:1, v:v; p. 17 and Appendix 5, pp. 107-109). The extracts were combined, brought to volume with acetonitrile:water (1:1, v:v), and an aliquot was filtered (0.45- μ m Acrodisc filter) and analyzed for prothioconazole and JAU6476-desthio by HPLC-UV (Phenomenex Luna C-18(2) column, 150 mm x 2.0 mm, 5- μ m; mobile phase of 0.1% phosphoric acid:acetonitrile, 55:45, v:v).

Metal pans (12-in diameter) containing approximately 500 g of sieved (2 mm) soil from the control plot were also placed in each section of the test plot prior to both applications (5 pans total for each application; p. 15). Soil from each pan was collected and poured into a plastic bag after each application. Samples of soil (12.5 g) from the soil pans were extracted three times by shaking with extraction solvent for one hour (pp. 18-19; Appendix 6, pp. 113-116). Extraction solvent was prepared by dissolving 1.0 g L-cysteine hydrochloride and 10 g guanidine hydrochloride in 1 L water and mixing 1:1 (v:v) with acetonitrile. The extracts were combined, brought to volume with extraction solvent, and an aliquot was filtered (0.45- μ m Acrodisc filter) and analyzed for prothioconazole and JAU6476-desthio by HPLC-UV (Phenomenex Luna C-18(2) column, 250 mm x 2.0 mm, 5- μ m; mobile phase of 0.1% phosphoric acid:acetonitrile, 55:45, v:v).

3. Field Spiking: Field spikes were prepared in duplicate at selected sampling intervals for JAU6476-desthio, JAU6476-S-methyl, and 1,2,4-triazole (p. 16; Table 15, p. 48). Soil samples were fortified with each analyte at 50 μ g/kg, frozen, and taken to the field during sampling. The field spikes were kept under the same conditions as the field cores until analysis. Field spikes were analyzed following 1211-1221 days of storage, which exceeded the longest storage interval for the field samples. Field spikes were not prepared for prothioconazole and JAU6476 thiazocine.

4. Volatilization: Volatilization was not measured.

5. Leaching: Fifteen cores were taken from the treated plot following both applications and at 2, 7, 14, 28, 61, 90, 120, 141, 218, 296, 306, 421, and 532 days after the second application to a depth of 120 cm (except application 1, day 0 (day -14) samples which were collected to a depth of 15 cm) to determine the mobility of the test substance in the soil profile (p. 15; Table 4, p. 32). Total water input for the first month of the study (May 1999, prorated) was 3.01 inches or 199% of the historical average (Table 5, p. 33).

6. Run off: Run off was not studied.

7. Supplementary Study: To determine the frozen storage stability of prothioconazole and the transformation products JAU6476-desthio, JAU6476-S-methyl, and JAU6476 thiazocine in soil, samples were fortified with JAU6476-desthio and JAU6476-S-methyl at 50 μ g/kg and with prothioconazole and JAU6476 thiazocine at 100 μ g/kg (p. 23; Table 15, p. 48). Samples were analyzed for prothioconazole following 644 days of storage, for JAU6476 thiazocine following

Data Evaluation Report on the terrestrial field dissipation of prothioconazole

PMRA Submission Number {.....}

EPA MRID Number 46246518

644 and 883 days of storage, and for JAU6476-desthio and JAU6476-S-methyl following 804 days of storage. Samples were not analyzed at day 0 to determine initial recoveries.

Additionally, a method validation study was conducted with control soil from the test site that was fortified with prothioconazole, JAU6476-desthio, JAU6476-S-methyl, JAU6476 thiazocine, and 1,2,4-triazole at 10 µg/kg (seven replicates) and 100 µg/kg (five replicates; p. 22).

Also, soil samples were fortified with prothioconazole, JAU6476-desthio, JAU6476-S-methyl, JAU6476 thiazocine, and 1,2,4-triazole at 50 µg/kg and analyzed concurrently with the test samples (p. 26).

8. Sampling:

Table 5: Soil sampling.

Details	Test site
Method of sampling (random or systematic)	Random
Sampling intervals	Immediately following both applications and at 2, 7, 14, 28, 61, 90, 120, 141, 218, 296, 306, 421, and 532 days after the second application.
Method of soil collection (eg., cores)	Cores
Sampling depth	120 cm, with the exception of samples collected immediately following the first application which were only collected to a depth of 15 cm.
Number of cores collected per plot	15 (three from each sampling section)
Number of segments per core	Eight
Length of soil segments	15 cm
Core diameter (Provide details if more than one width)	5.72 cm (2.25 inches) for the 0- to 15-cm depth cores and 4.45 cm (1.75 inches) for the 15- to 120-cm depth cores.
Method of sample processing, if any	Following sectioning of the soil cores, three sample composites were prepared for each sampling interval and depth by combining one core from each section of the plot. Composite samples were homogenized by mixing with dry ice, and then run through a hammermill equipped with a 2-mm sieve. The milled soil was mixed in a bucket mixer and transferred to a freezer for dry ice sublimation.
Storage conditions	Frozen
Storage length (days)	Up to 1114 days for prothioconazole, JAU6476-desthio, JAU6476-S-methyl, and JAU6476 thiazocine. Up to 718 days for 1,2,4-triazole.

Data were obtained from pp. 15-16 and Table 4, p. 12 and Tables 9-13, pp. 37-46 of the study report.

9. Analytical Procedures: Soil samples were analyzed for prothioconazole and the transformation products JAU6476-desthio (2-[2-(1-chlorocyclopropyl)-3-(2-chlorophenyl)-2-

Data Evaluation Report on the terrestrial field dissipation of prothioconazole

PMRA Submission Number {.....}

EPA MRID Number 46246518

hydroxypropyl]-1,2-dihydro-3H-1,2,4-triazole), JAU6476-S-methyl (alpha-1(1-chlorocyclopropyl)-alpha-[(2-chlorophenyl)methyl]-3-(methylthio)-1H-1,2,4-triazole-1-ethanol), JAU6476 thiazocine (6-(1-chlorocyclopropyl)-6,7-dihydro-triazole-5H-[1,2,4]triazolo[5,1-b][1,3]benzothiazon-6-ol), and 1,2,4-triazole (1-H-1,2,4-triazole; pp. 12 and 19, and Figure 1, pp. 49-51). Analytical purities of the reference compounds were 99.4% for prothioconazole, 99.6% for JAU6476-desthio, 98.9% for JAU6476-S-methyl, 97.4% for JAU6476 thiazocine, and 100% for 1,2,4-triazole.

Analytical method for prothioconazole, JAU6476-desthio, JAU6476-S-methyl and JAU6476 thiazocine. Soil samples (15 g) were extracted by shaking for one hour with acetonitrile:water:cysteine hydrochloride (800:200:0.5, v:v:w), and the slurry was centrifuged for 10 minutes (pp. 19-20; Appendix 7, pp. 120-122). Following extraction, a mixed internal standard of prothioconazole, JAU6476-desthio, JAU6476-S-methyl, and JAU6476 thiazocine was added to an aliquot of the extract, and a 700- μ L aliquot was diluted with 300 μ L of water. The extracts were analyzed by HPLC (Luna C18 column, 100 x 4.6 mm, 5 μ) using MS/MS detection. The mobile phase conditions for the separation consisted of mobile phase A (0.1% formic acid in water) and B (0.1% formic acid in acetonitrile) under the following gradient conditions: A:B, 55:45 to 5:95 to 55:45. Retention times were 3.5 minutes for JAU6476 thiazocine, 4.8 minutes for JAU6476-desthio, 5.4 minutes for prothioconazole, and 6.7 minutes for JAU6476-S-methyl.

Analytical method for 1,2,4-triazole. Soil samples (15 g) were sonicated for one hour at 65°C with acetonitrile:water (6:4, v:v), and the slurry was centrifuged for 10 minutes (p. 21; Appendix 8, pp. 127-130). Following extraction, a triazole internal standard was added to a 1-mL aliquot of the extract, and 4 mL of 10 mM dansyl chloride and 4 mL of 0.25 M sodium bicarbonate were added to form a dansyl triazole derivative. After sonication for 30 minutes, 1 mL of 0.5 M ammonium hydroxide was added and the derivative was partitioned with 6 mL of ethyl acetate. The ethyl acetate layer was dried through anhydrous sodium sulfate, evaporated to dryness and reconstituted in 1 mL of water:acetonitrile (1:1, v:v), and filtered through a 0.45- μ m nylon Acrodisc. The extracts were analyzed by HPLC (Luna C18 column, 100 x 4.6 mm, 5 μ) using MS/MS detection. The mobile phase conditions for the separation consisted of mobile phase A (0.1% formic acid in water) and B (0.1% formic acid in acetonitrile) under the following gradient conditions: A:B, 50:50 to 30:70 to 10:90 to 50:50. The approximate retention time of dansyl 1,2,4-triazole was 5.4 minutes.

The LOQ was 0.01 μ g/g for all compounds in soil and the method detection limit (MDL) was 2.5 μ g/kg for prothioconazole, 2.7 μ g/kg for JAU6476-desthio, 1.2 μ g/kg for JAU6476-S-methyl, 1.8 μ g/kg for JAU6476 thiazocine, and 1.3 μ g/kg for 1,2,4-triazole (pp. 22 and 26).

II. RESULTS AND DISCUSSION

1. APPLICATION MONITORS: Mean recoveries of prothioconazole from the soil pads were 98% and 85% of the applied amount (6.3 oz. a.i./A; 110% of label rate) based on the field application calculations for the first and second applications, respectively (calculated from Table 7, p. 35). Corresponding recoveries as a percent of the label rate (5.72 oz. a.i./A) were 108% and 94% (Table 7, p. 35). Mean recoveries from the soil pans were 75% and 82% of the applied

Data Evaluation Report on the terrestrial field dissipation of prothioconazole

PMRA Submission Number {.....}

EPA MRID Number 46246518

amount (6.3 oz. a.i./A; 110% of label rate) based on the field application calculations for the first and second applications, respectively (calculated from Table 7, p. 35). Corresponding recoveries as a percent of the label rate (5.72 oz. a.i./A) were 83% and 90% (Table 7, p. 35).

2. RECOVERY FROM FIELD SPIKES: Recoveries from field spikes prepared for JAU6476-desthio, JAU6476-S-methyl, and 1,2,4-triazole in duplicate at 50 µg/kg were 82-83%, 85-86%, and 67-70%, respectively, following 1211-1221 days of storage (Table 15, p. 48). Field spikes were not prepared for prothioconazole and JAU6476 thiazocine.

3. MASS ACCOUNTING: A mass balance was not determined, because the study was conducted using non-radiolabeled material.

Data Evaluation Report on the terrestrial field dissipation of prothioconazole

PMRA Submission Number {.....}

EPA MRID Number 46246518

Table 6. Mean concentration of prothioconazole residues expressed as µg/kg soil, at the test site.

Compound	Soil depth (cm)	Sampling times (days following the last application)														
		App 1 (-14)	App 2 (0)	2	7	14	28	61	90	120	141	218	296	306	421	532
Prothioconazole (JAU6476)	0-15 reps	56.9	67.7	(2.5)	(5.6)	(4.0)										
		45.3	56.9	ND	(4.7)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		70.3	60.0	(2.5)	(5.5)	(3.9)										
	Mean	57.5	61.5	(2.5)	(5.3)	(3.5)										
	15-30	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	30-45	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
JAU6476-desthio	0-15 reps	33.0	81.6	51.1	63.5	53.1	59.2	18.7	18.0	(5.1)	(9.4)	(9.2)	(9.8)	(4.2)		ND
		44.0	84.9	53.1	73.0	52.3	41.7	23.7	15.6	11.1	10.2	(4.7)	(5.1)	(4.5)	ND	ND
		56.2	79.5	53.1	77.7	55.0	47.5	23.9	(8.4)	(6.5)	(9.2)	15.1	(7.2)	(3.1)		3.6
	Mean	44.4	82.0	52.4	71.4	53.5	49.5	22.1	14.0	(7.6)	(9.6)	(9.7)	(7.4)	(3.9)		(3.0)
	15-30 reps	NS	ND (4.0)	ND	ND (4.6)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Mean		(4.1)		(5.1)											
	30-45	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
JAU6476-S-methyl	0-15 reps	ND	(7.1)	(2.5)	(9.7)	(5.9)	(6.8)	(2.0)	(1.2)		(1.5)					
			(7.5)	(1.2)	(8.3)	(5.7)	(4.5)	(2.0)	(1.9)	ND	ND	ND	ND	ND	ND	ND
			(6.9)	(2.5)	12.3	(6.6)	(5.3)	(2.4)	ND		ND					
	Mean		(7.2)	(2.1)	10.1	(6.1)	(5.5)	(2.1)	(1.4)		(1.3)					
	15-30	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	30-45	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
JAU6476 thiazocine	0-15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	15-30	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Data Evaluation Report on the terrestrial field dissipation of prothioconazole

PMRA Submission Number {.....}

EPA MRID Number 46246518

Compound	Soil depth (cm)	Sampling times (days following the last application)															
		App 1 (-14)	App 2 (0)	2	7	14	28	61	90	120	141	218	296	306	421	532	
1,2,4-triazole	30-45	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	0-15	ND	(2.9) (3.9) (3.2) (3.3)	(3.7) (3.0) (3.1) (3.3)	(3.4) (3.5) (4.0) (3.6)	(4.0) (4.0) (3.8) (3.3)	(4.2) (4.5) (5.1) (4.6)	(4.0) (3.3) (3.6) (3.6)	(3.0) (3.1) (2.4) (2.8)	(4.3) (5.3) (5.0) (4.9)	(3.9) (4.5) (3.2) (3.9)	(2.5) (2.0) (2.8) (2.4)	(2.2) (1.8) (1.9) (2.0)	(2.4) (2.2) (2.1) (2.2)	(1.4) ND ND (1.3)	ND	
	15-30	NS	(1.6) ND (1.5) (1.5)	(1.5) (1.4) ND (1.4)	(1.5) (1.4) (1.5) (1.5)	(1.5) (1.8) ND (1.5)	(2.3) (2.2) (2.5) (2.3)	(3.0) (3.1) (2.6) (2.9)	(3.2) (3.1) (2.4) (2.9)	(2.9) (2.2) (2.1) (2.4)	(3.4) (2.6) (3.8) (3.3)	(2.2) (1.5) (2.5) (2.1)	(2.0) (2.6) (1.4) (2.0)	(2.5) (1.9) (3.6) (2.7)	(2.0) ND (1.6) (1.6)	(2.3) (9.6) (1.5) (4.5)	
	30-45	NS	(1.5) (1.8) ND (1.5)	ND	ND	ND	ND	(2.1) (1.7) (2.6) (2.1)	(2.3) (1.8) (1.7) (1.9)	(2.0) (1.7) (1.7) (1.8)	(3.2) (1.8) (2.4) (2.5)	(1.6) ND (1.6) (1.5)	ND	ND	ND (1.5) (1.4)	(2.1) (1.4) ND (1.6)	ND (1.6) (1.5) (1.5)

Data were obtained from Tables 9-13, pp. 37-46 of the study report. Values in parenthesis are below the LOQ (10 µg/kg) and above the MDL (2.5, 2.7, 1.2, 1.8, and 1.3 µg/kg for prothioconazole, JAU6476-desthio, JAU6476-S-methyl, JAU6476-thiazocine, and 1,2,4-triazole, respectively). ND = Not detected, i.e. below the MDL. ND replicates are assumed to be at MDL for averaging purposes. NS = Not sampled. Total extractable and total non-extractable residues were not determined. Samples were analyzed only to a depth of 15 cm at day 0 following the first application.

Data Evaluation Report on the terrestrial field dissipation of prothioconazole

PMRA Submission Number {.....}

EPA MRID Number 46246518

4. PARENT COMPOUND: The mean concentration of prothioconazole in the 0-15 cm soil depth following the first application (-14 days) was 57.5 µg/kg, which is 29.8% of the theoretical applied concentration, 193.1 µg/kg (32.8% of the theoretical concentration if applied at label rate, 175 µg/kg) (calculated from Table 9, p. 37). Following the second application, prothioconazole was detected in the 0-15 cm soil depth at a mean of 61.5 µg/kg at day 0, and decreased to <LOQ by 2 days posttreatment. Prothioconazole was not detected below the 0-15 cm soil depth.

The half-life of prothioconazole in soil under terrestrial field conditions was 4.7 days ($r^2 = 0.3470$), calculated using linear regression on all available individual replicate log-transformed prothioconazole concentrations (0-15 cm soil depth). The observed DT50 was <2 days. The observed DT90 occurred <2 days, as well.

5. TRANSFORMATION PRODUCTS: The only major transformation product detected was **JAU6476-desthio** (2-[2-(1-chlorocyclopropyl)-3-(2-chlorophenyl)-2-hydroxypropyl]-1,2-dihydro-3H-1,2,4-triazole), with a maximum mean concentration of 25.3% of applied parent (44.4 µg/kg) observed before the maximum total application, on the day of the first application (-14 days) in the 0-15 cm soil layer (Tables 9-13, pp. 37-46). The maximum mean concentration observed after both applications had been applied was 23.4% of applied parent (82.0 µg/kg) on the day of the second application in the 0-15 cm soil layer. After its initial detection at maximum concentration, JAU6476-desthio decreased to a mean of 49.5 µg/kg (14.1% of applied prothioconazole) by 287 days post second application, decreased below the LOQ to 7.4-9.7 µg/kg (2.1-2.8% of applied parent) at 120-296 days, and decreased below the MDL by the end of the study period (532 days post second application). JAU6476-desthio was not detected above the LOQ in soil below the 0-15 cm depth. The $t_{1/2}$ value for JAU6476-desthio was 96.3 days ($r^2 = 0.7342$), calculated using linear regression on all available replicate log-transformed data (0-15 cm soil depth) from the day with the observed individual replicate peak concentration (0DAT). The observed DT50 occurred between 28-61 days. The observed DT90 was 120-296 days.

The minor transformation product **JAU6476-S-methyl** (alpha-1(1-chlorocyclopropyl)-alpha-[(2-chlorophenyl)methyl]-3-(methylthio)-1H-1,2,4-triazole-1-ethanol) was only detected above the LOQ once, at 12.3 µg/kg (single replicate) at 7 days following the second application in the 0-15 cm soil depth (which is 3.1% of the applied prothioconazole based on two applications, after converting to parent equivalents), and was detected below the LOQ but above the MDL from 14-141 days posttreatment. JAU6476-S-methyl was initially detected in the 0-15 cm soil depth at 7.2 µg/kg (1.8% of applied parent) immediately following the second application, increased to a maximum mean of 10.1 µg/kg (2.5% of applied parent) at 7 days, then decreased to below the MDL by 218 days. JAU6476-S-methyl was not detected below the 0-15 cm soil depth. The $t_{1/2}$ value for JAU6476-S-methyl was 41.3 days ($r^2 = 0.8108$), calculated using linear regression on all available replicate log-transformed data (0-15 cm soil depth) from the day with the observed individual replicate peak concentration (7DAT). The observed DT50 occurred at 21 days. The observed DT90 was not reportable (DT90<MDL).

The minor transformation product 1,2,4-triazole (1-H-1,2,4-triazole) was not detected above the LOQ at any sampling interval, but was detected at levels below the LOQ but above the MDL

Data Evaluation Report on the terrestrial field dissipation of prothioconazole

PMRA Submission Number {.....}

EPA MRID Number 46246518

throughout the study period at all soil depths analyzed, with a maximum mean concentration of 4.9 ⁰⁰g/kg (6.3% of applied parent) at 120 days after the second application, and a final concentration of 2.2 ⁰⁰g/kg (2.9% of applied parent) at 306 days. JAU6476-thiazocine was not detected above the MDL in any sampling interval at any depth.

Transformation product concentrations were converted to parent equivalents by adjusting for molecular weight (see Comment 1 for sample calculation).

Table 7: Chemical names and CAS numbers for the transformation products of prothioconazole.

Applicant's Code Name	CAS Number	CAS and/or IUPAC Chemical Name(s)	Chemical formula	Molecular weight	SMILES string
JAU6476-desthio	NA	2-[2-(1-Chlorocyclopropyl)-3-(2-chlorophenyl)-2-hydroxy-propyl]-1,2-dihydro-3H-1,2,4-triazole	C ₁₄ H ₁₅ Cl ₂ N ₃ O	312.2	See Attachment 1
JAU6476-S-methyl	NA	Alpha-1(1-chlorocyclopropyl)-alpha-[(2-chlorophenyl)-methyl]-3-(methyl-thio)-1H-1,2,4-triazole-1-ethanol	C ₁₅ H ₁₇ Cl ₂ N ₃ OS	358.3	See Attachment 1
JAU6476 thiazocine	NA	6-(1-Chlorocyclopropyl)-6,7-dihydro-triazole-5H-[1,2,4]triazolo[5,1-b][1,3]benzothiazon-6-ol	C ₁₄ H ₁₄ N ₃ ClOS	307.8	See Attachment 1
1,2,4-triazole	NA	1-H-1,2,4-triazole	C ₂ H ₃ N ₃	69.1	See Attachment 1

Data were obtained from Figure 1, pp. 49-51 of the study report.

6. EXTRACTABLE AND NON-EXTRACTABLE RESIDUES: Non-extractable residues were not measured.

Table 8: Dissipation routes of prothioconazole under field conditions.

Route of dissipation	% of applied amount (at the end of study period)
	Test site
Accumulation (residues) in soil/carry over ¹	0%
Transformation ¹	2.3% (1,2,4-triazole); 0.7% (JAU6476-desthio)
Leaching, if measured	No residues of the parent or transformation products were detected above the LOQ in soil below the 0-15 cm depth at any sampling interval., however, 1,2,4-triazole was detected above the MDL at all depths measured (down to 45 cm).

Data Evaluation Report on the terrestrial field dissipation of prothioconazole

PMRA Submission Number {.....}

EPA MRID Number 46246518

	% of applied amount (at the end of study period)
Volatilization, if measured	Not measured
Plant uptake, if measured	N/A
Run off, if measured	Not measured
Total	

Data were obtained from Tables 9-13, pp. 37-46 of the study report.

¹ Calculated as a percent of the total applied prothioconazole, based on two applications (193.1 µg a.i./kg x 2 applications = 386.3 µg a.i./kg).

7. VOLATILIZATION: The concentration of applied prothioconazole lost through volatilization was not determined.

8. PLANT UPTAKE: N/A.

9. LEACHING: No residues of the parent or transformation products were detected above the LOQ in soil below the 0-15 cm depth at any sampling interval (Tables 9-13, pp. 37-46).

10. RUN OFF: Run off was not studied.

11. RESIDUE CARRYOVER: At the end of the study period, 532 days after the second application, the total carryover of the parent and transformation products was 0% and <1% of the total applied prothioconazole (based on two applications), respectively (Tables 9-13, pp. 37-46). The only transformation products detected at the end of the study period were 1,2,4-triazole and JAU6476-desthio (in single replicates).

12. SUPPLEMENTARY STUDY RESULTS: The laboratory storage stability study was inadequate to demonstrate stability of any of the analytes during storage because samples were not analyzed at time 0, and were analyzed only at one time point (with the exception of JAU6476 thiazocine, which was analyzed at two time points; Table 15, p. 48). Recovery of prothioconazole was 13% following 644 days, recovery of JAU6476 thiazocine was 83-84% following 644-883 days, recovery of JAU6476-desthio was 68% following 804 days, and recovery of JAU6476-S-methyl was 86% following 804 days.

Mean recoveries for the additional method validation study at the 10 µg/kg fortification level were 89.3%, 107.0%, 111.2%, 116.3%, and 105.2% for prothioconazole, JAU6476-desthio, JAU6476-S-methyl, JAU6476 thiazocine, and 1,2,4-triazole, respectively. Mean recoveries at the 100 µg/kg fortification level were 90.6%, 96.8%, 98.9%, 100.4%, and 95.4% for prothioconazole, JAU6476-desthio, JAU6476-S-methyl, JAU6476 thiazocine, and 1,2,4-triazole, respectively (p. 25; Table 8, p. 36).

Recoveries from soil samples that were fortified with prothioconazole, JAU6476-desthio, JAU6476-S-methyl, JAU6476 thiazocine, and 1,2,4-triazole at 50 µg/kg and analyzed concurrently with the test samples ranged from 86-107% for prothioconazole, 87-108% for

Data Evaluation Report on the terrestrial field dissipation of prothioconazole

PMRA Submission Number {.....}

EPA MRID Number 46246518

JAU6476-desthio, 97-107% for JAU6476-S-methyl, 94-107% for JAU6476 thiazocine, and 81-100% for 1,2,4-triazole (p. 26).

III. STUDY DEFICIENCIES:

The laboratory storage stability study was inadequate to demonstrate stability of any of the analytes during storage because samples were not analyzed at time 0 to determine initial recoveries, and sampling intervals were inadequate to determine stability of the analytes over time.

Of particular concern, prothioconazole was not shown to be stable in soil samples stored frozen for any length of time, with a recovery of 13% following 644 days of storage (Table 15, p. 48). In this study, prothioconazole was in storage up to 1114 days before analysis. While prothioconazole can be expected to degrade rapidly to JAU6476-desthio under field conditions, it is necessary to demonstrate the stability of prothioconazole under typical storage conditions to ensure that the degradation of the parent occurred in the field and not during storage of the test samples. If the parent compound degraded during storage of the samples, then the calculated half-life value will not correctly reflect dissipation in the field.

IV. REVIEWER'S COMMENTS:

1. Laboratory storage stability samples were analyzed only at one time point (with the exception of samples of JAU6476 thiazocine, which were analyzed at two time points). Laboratory storage stability samples should be analyzed at time 0 and up to at least the maximum storage interval for test samples, with a sufficient number of intervals in between, to allow the reviewer to determine stability of the analytes over time.

The sum of prothioconazole and JAU6476-desthio residues detected immediately following the first application (at -14 days) accounted for only 55.1% of the applied amount (29.8% as prothioconazole and 25.3% as JAU6476-desthio, calculated from p. 26; Tables 9, 10, p. 37, 39)), whereas recoveries from soil pads and pans report that the test compound was applied at an average of 82-98% of the the theoretical target application amount (calculated from Table 7, p. 35). No other transformation products were detected above the LOQ immediately following the first application. This suggests that residues could have been lost from field samples during storage, which was 1112 days for the -14 days sampling interval (directly after the first application) (Table 9, p. 37). Part of the missing starting material can be attributed to non-extractable residues. The study author states, without supporting data, that in an experiment to test the binding of ¹⁴C-labeled prothioconazole to soil, control soil was fortified and immediately analyzed for the parent, and that the time zero recovery indicated that 41% of the applied radioactivity was bound to the soil (pp. 23 and 27).

The stability of the transformation products JAU6476-desthio, JAU6476-S-methyl, and 1,2,4-triazole was reported 82-83%, 85-86%, and 67-70%, after 1211, 1211, and 1221 days of storage, respectively, based on recoveries from field spikes that were fortified in

Data Evaluation Report on the terrestrial field dissipation of prothioconazole

PMRA Submission Number {.....}

EPA MRID Number 46246518

- the laboratory, then sent to the field site and kept under the same conditions as the field samples (Table 15, p. 48). JAU6476-thiazocine was reported 84% stable after 883 days of storage, based on fortified spikes which were not shipped to the field (Table 15, p. 47).
2. To determine percentage of the applied values for the transformation products, transformation product concentration values were converted to parent equivalents by multiplying the transformation product concentrations by the corresponding parent-to-degradate molecular weight ratios. The ratios were calculated by dividing the molecular weight of the parent (344.3 g/mol) by the molecular weight of the transformation product (312.2, 358.3, 307.8, and 69.1 g/mol for JAU6476-desthio, JAU6476-S-methyl, JAU6476 thiazocine, and 1,2,4-triazole, respectively). For example, for JAU6476-desthio, 312.2 g/mol divided by 344.3 g/mol equals 0.91. Therefore, 33.0 µg/kg of JAU6476-desthio (detection at day -14, 0-6 in. soil depth, first replicate) is converted to 36.4 µg/kg parent equivalents by multiplying by 344.3/312.2.

The percent of each transformation product in terms of percent of the applied prothioconazole was calculated by dividing the concentration of the transformation product in parent equivalents by the theoretical applied concentration of prothioconazole in the 0-15 cm soil depth (193.1 µg a.i./kg; calculated based on the site-specific bulk density of the 0-15 cm soil depth (1.5 g/cm³) and the applied rate (6.3 oz a.i./A, i.e., 110% of label rate)). For example, for JAU6476-desthio, 36.4 µg/kg parent equivalents (detection at day -70, 0-15 cm soil depth, first replicate; see above calculation) divided by 193.1 µg a.i./kg = 0.188 or 18.8% of the theoretically applied prothioconazole, based on one application. To represent transformation products as percent of labelled rate, the same calculations are repeated using label application rate (5.72 oz a.i./A), instead of theoretically applied rate, to obtain a labelled rate concentration of 175.4 µg a.i./kg. For example, for JAU6476-desthio, 36.4 µg/kg parent equivalents (detection at day -70, 0-15 cm soil depth, first replicate; see above calculation) divided by 175.4 µg a.i./kg = 0.208 or 20.8% of the labelled rate of prothioconazole, based on one application.

3. Applied rate and number of applications do not correlate to current proposed label. While this study used two applications of 6.3 ounces ai/A, the current proposed label allows four applications of 2.85 ounces ai/acre. It is possible that the field dissipation pattern of prothioconazole may be altered, if applied more times at a lower rate.
4. Application verification was variable after the first application; the difference between pads and pans is large (for example, Application 1: 15-32% of applied (17-35% of label rate) difference between pad and pan application at the same section, with the pads consistently higher. Recoveries for Application 1 were as low as 63% and as high as 113% of applied (69% and 124% of label rate, respectively).) It remains questionable whether there was consistent application on the test field.
5. Tank mix samples were collected but were not analyzed because the analyses of verification pads and pans showed that the applications were satisfactory, as stated by the study author (pp. 15 and 25).

Data Evaluation Report on the terrestrial field dissipation of prothioconazole

PMRA Submission Number {.....}

EPA MRID Number 46246518

6. The reviewer notes that two additional field dissipation studies were conducted on bare plots following six applications of the test substance at test sites in California (MRID 46246517) and New York (MRID 46246519).

V. REFERENCES:

1. U.S. Environmental Protection Agency. 1982. Pesticide Assessment Guidelines, Subdivision N, Chemistry: Environmental Fate, Section 164-1, Terrestrial Field Dissipation Studies. Office of Pesticide and Toxic Substances, Washington, DC. EPA 540/9-82-021.
2. U.S. Environmental Protection Agency. 1993. Pesticide Registration Rejection Rate Analysis - Environmental Fate. Office of the Prevention, Pesticides, and Toxic Substances, Washington, DC. EPA 738-R-93-010.
3. U.S. Environmental Protection Agency. 1989. FIFRA Accelerated Reregistration, Phase 3 Technical Guidance. Office of the Prevention, Pesticides, and Toxic Substances, Washington, DC. EPA 540/09-90-078.

Attachment 1

Structures of Parent and Transformation Products

Data Evaluation Report on the terrestrial field dissipation of prothioconazole

PMRA Submission Number {.....}

EPA MRID Number 46246518

Prothioconazole [JAU6476]

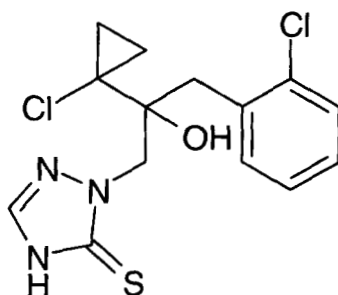
IUPAC name: (RS)-2-[2-(1-Chlorocyclopropyl)-3-(2-chlorophenyl)-2-hydroxypropyl]-2,4-dihydro-3H-1,2,4-triazole-3-thione.

CAS name: 2-[2-(1-Chlorocyclopropyl)-3-(2-chlorophenyl)-2-hydroxypropyl]-1,2-dihydro-3H-1,2,4-triazole-3-thione.

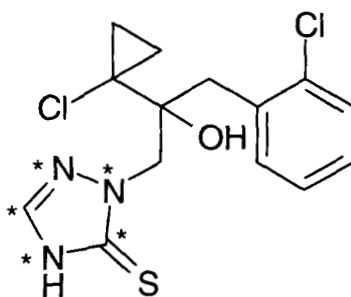
CAS No: 178928-70-6.

SMILES string: ClC1(C(Cc2ccccc2Cl))(CN2N=CNC2=S)OCC1.

Unlabeled



[Triazole-1,2,4-¹⁵N,3,5-¹³C]JAU6476



*Position of radiolabel.

Data Evaluation Report on the terrestrial field dissipation of prothioconazole

PMRA Submission Number {.....}

EPA MRID Number 46246518

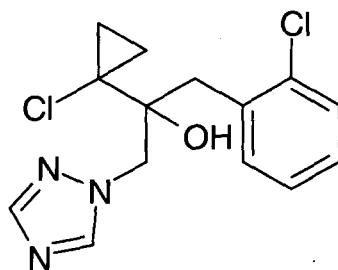
JAU6476-desthio [SXX0665]

IUPAC name: Not reported.

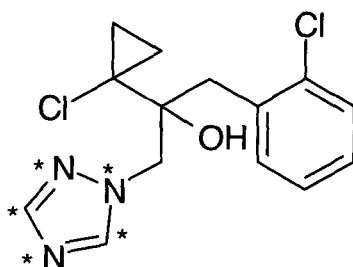
CAS name: 2-[2-(1-Chlorocyclopropyl)-3-(2-chlorophenyl)-2-hydroxypropyl]-1,2-dihydro-3H-1,2,4-triazole.

CAS No.: Not reported.

Unlabeled



[1,2,4-¹⁵N₃,3,5-¹³C₂]JAU6476-desthio



*Position of radiolabel.

Data Evaluation Report on the terrestrial field dissipation of prothioconazole

PMRA Submission Number {.....}

EPA MRID Number 46246518

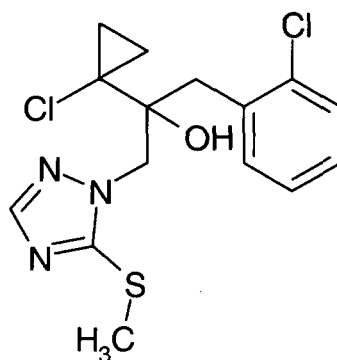
JAU6476-S-methyl or S-methyl-JAU6476 [KTS9473; WAK7681]

IUPAC name: Not reported.

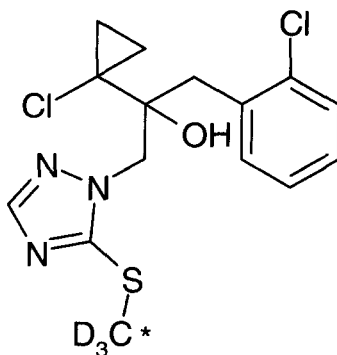
CAS name: alpha-1(1-Chlorocyclopropyl)-alpha-[(2-chlorophenyl)methyl]-3-(methylthio)-1H-1,2,4-triazole-1-ethanol.

CAS No.: Not reported.

Unlabeled



[Methyl-d₃-¹³C]JAU6476-S-methyl or [Methyl-d₃-¹³C]S-methyl-JAU6476



*Position of radiolabel; D = deuterium; ²H.

Data Evaluation Report on the terrestrial field dissipation of prothioconazole

PMRA Submission Number {.....}

EPA MRID Number 46246518

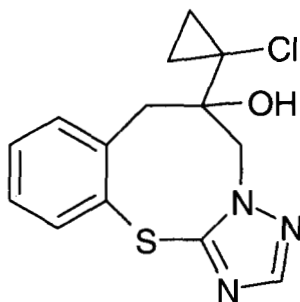
JAU6476-thiazocine

IUPAC name: Not reported.

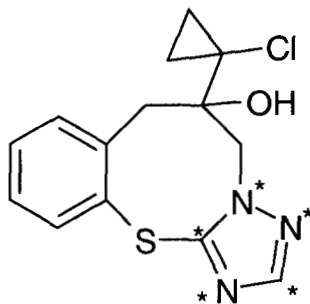
CAS name: 6-(1-Chlorocyclopropyl)-6,7-dihydro-triazole-5H-[1,2,4]triazolo[5,1-b][1,3]benzothiazon-6-ol.

CAS No.: Not reported.

Unlabeled



[Thiazocine-¹⁵N₃-¹³C₂]JAU6476-thiazocine



*Position of radiolabel.

Data Evaluation Report on the terrestrial field dissipation of prothioconazole

PMRA Submission Number {.....}

EPA MRID Number 46246518

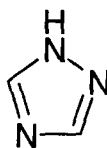
1,2,4-triazole or 1-H-1,2,4-triazole

IUPAC name: Not reported.

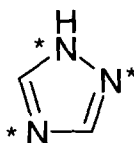
CAS name: 1-H-1,2,4-triazole.

CAS No.: Not reported.

Unlabeled



[1,2,4-¹⁵N₃]1,2,4-triazole or [1,2,4-¹⁵N₃]1-H-1,2,4-triazole



*Position of radiolabel.

Chemical Name Prothioconazole
 PC Code 113961
 MRID 46246518
 Guideline No. 164-1

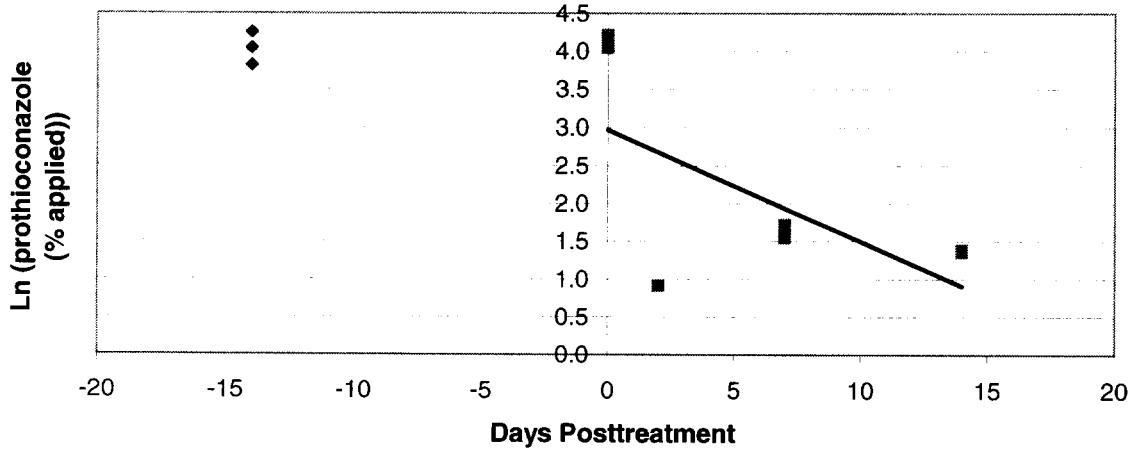
New York field site
Half-life (days) = 4.7 * 0- to 15-cm soil depth

Days	Prothioconazole (ppb)	Ln (Prothioconazole)
-14	56.9	4.04
-14	45.3	3.81
-14	70.3	4.25
0	67.7	4.22
0	56.9	4.04
0	60.0	4.09
2	2.5	0.92
2	<MDL	---
2	2.5	0.92
7	5.6	1.72
7	4.7	1.55
7	5.5	1.70
14	4.0	1.39
14	<MDL	---
14	3.9	1.36
28	<MDL	---
28	<MDL	---
28	<MDL	---
61	<MDL	---
61	<MDL	---
61	<MDL	---
90	<MDL	---
90	<MDL	---
90	<MDL	---
120	<MDL	---
120	<MDL	---
120	<MDL	---
141	<MDL	---
141	<MDL	---
141	<MDL	---
218	<MDL	---
218	<MDL	---
218	<MDL	---
296	<MDL	---
296	<MDL	---
296	<MDL	---
306	<MDL	---
306	<MDL	---
306	<MDL	---
421	<MDL	---
421	<MDL	---
421	<MDL	---
532	<MDL	---
532	<MDL	---
532	<MDL	---

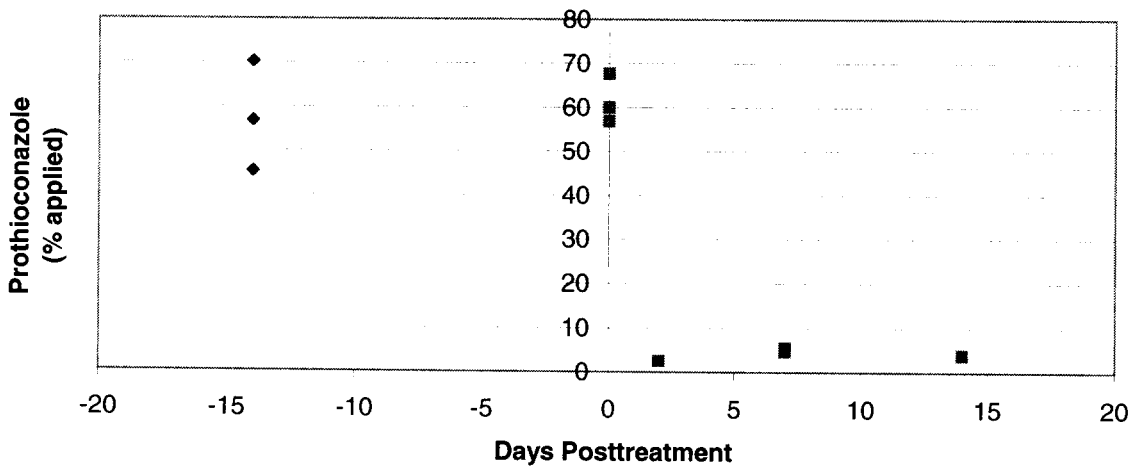
Data obtained from Table 9, pp. 37-38 of the study report.
 LOQ= 10 ppb; MDL= 2.5 ppb.

Chemical Name Prothioconazole
PC Code 113961
MRID 46246518
Guideline No. 164-1

Dissipation of prothioconazole following two applications in Georgia (0- to 15-cm soil depth)
 $y = -0.1471x + 2.9703$
 $R^2 = 0.347$



Dissipation of prothioconazole following two applications in Georgia (0- to 15-cm soil depth)



Chemical Name Prothioconazole
 PC Code 113961
 MRID 46246518
 Guideline No. 164-1

New York field site

Half-life (days) = **96.3** * 0- to 15-cm soil depth
 (calculated from day with concentration peak, 0DAT)

Days	Prothioconazole-desthio (ppb)	Ln (Prothioconazole-desthio)
-14	33.0	3.50
-14	44.0	3.78
-14	56.2	4.03
0	81.6	4.40
0	84.9	4.44
0	79.5	4.38
2	51.1	3.93
2	53.1	3.97
2	53.1	3.97
7	63.5	4.15
7	73.0	4.29
7	77.7	4.35
14	53.1	3.97
14	52.3	3.96
14	55.0	4.01
28	59.2	4.08
28	41.7	3.73
28	47.5	3.86
61	18.7	2.93
61	23.7	3.17
61	23.9	3.17
90	18.0	2.89
90	15.6	2.75
90	8.4	2.13
120	5.1	1.63
120	11.1	2.41
120	6.5	1.87
141	9.4	2.24
141	10.2	2.32
141	9.2	2.22
218	9.2	2.22
218	4.7	1.55
218	15.1	2.71
296	9.8	2.28
296	5.1	1.63
296	7.2	1.97
306	4.2	1.44
306	4.5	1.50
306	3.1	1.13
421	<MDL	---
421	<MDL	---
421	<MDL	---
532	<MDL	---
532	<MDL	---
532	3.6	1.28

Data obtained from Table 10, pp. 39-40 of the study report.
 LOQ= 10 ppb; MDL= 2.7 ppb.

Chemical Name Prothioconazole
 PC Code 113961
 MRID 46246518
 Guideline No. 164-1

New York field site

Half-life (days) = 41.3 * 0- to 15-cm soil depth
 (calculated from day with concentration peak, 7DAT)

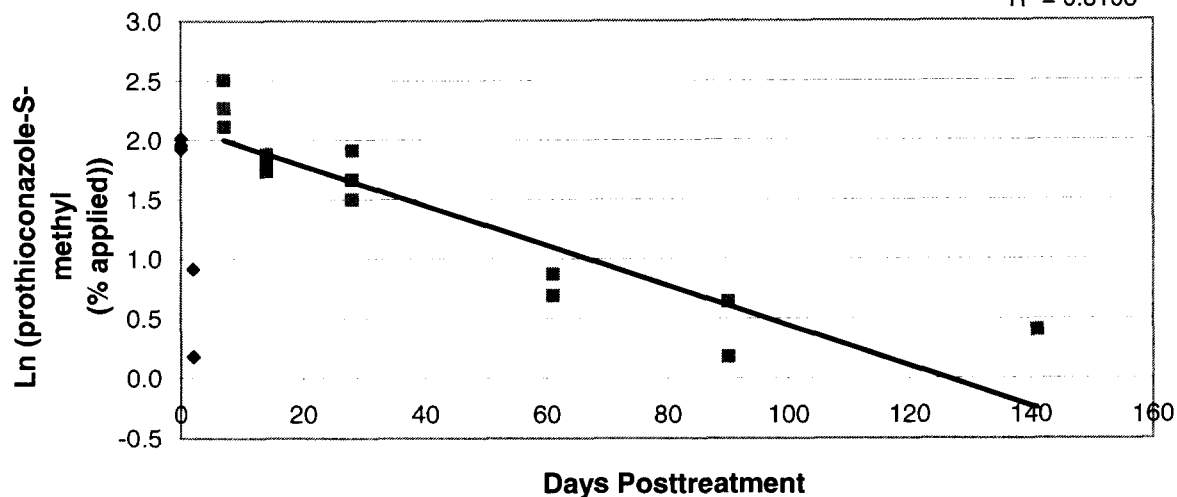
Days	Prothioconazole-S-methyl (ppb)	Ln (Prothioconazole-S-methyl)
-14	<MDL	---
-14	<MDL	---
-14	<MDL	---
0	7.1	1.96
0	7.5	2.01
0	6.9	1.93
2	2.5	0.92
2	1.2	0.18
2	2.5	0.92
7	9.7	2.27
7	8.3	2.12
7	12.3	2.51
14	5.9	1.77
14	5.7	1.74
14	6.6	1.89
28	6.8	1.92
28	4.5	1.50
28	5.3	1.67
61	2.0	0.69
61	2.0	0.69
61	2.4	0.88
90	1.2	0.18
90	1.9	0.64
90	<MDL	---
120	<MDL	---
120	<MDL	---
120	<MDL	---
141	1.5	0.41
141	<MDL	---
141	<MDL	---
218	<MDL	---
218	<MDL	---
218	<MDL	---
218	<MDL	---
296	<MDL	---
296	<MDL	---
296	<MDL	---
306	<MDL	---
306	<MDL	---
306	<MDL	---
421	<MDL	---
421	<MDL	---
421	<MDL	---
421	<MDL	---
532	<MDL	---
532	<MDL	---
532	<MDL	---

Data obtained from Table 11, pp. 41-42 of the study report.
 LOQ= 10 ppb; MDL= 1.2 ppb.

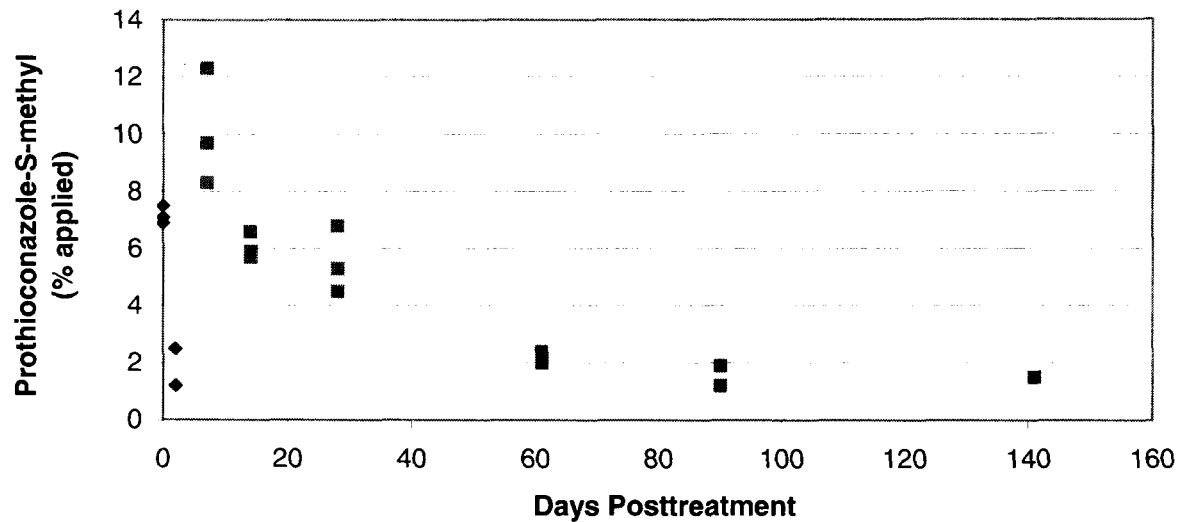
Chemical Name Prothioconazole
PC Code 113961
MRID 46246518
Guideline No. 164-1

Dissipation of prothioconazole-S-methyl following two applications in Georgia (0- to 15-cm soil depth)

$$y = -0.0168x + 2.1204$$
$$R^2 = 0.8108$$



Dissipation of prothioconazole-S-methyl following two applications in Georgia (0- to 15-cm soil depth)



Chemical Name Prothioconazole
 PC Code 113961
 MRID 46246518
 Guideline No. 164-1

Prothioconazole application verification, as % of label rate (5.72 oz. a.i./A).

Application 1	A	B	C	D	E	AVR
pads	109	104	124	104	99	108
pans	92	81	100	69	73	83
Application 2						
pads	98	85	91	90	106	94
pans	89	95	72	105	88	90

Data obtained from Table 7, pp. 35 of the study report.

Prothioconazole application verification, as % of applied rate (6.3 oz. a.i./A).

Application 1	A	B	C	D	E	AVR
pads	99	94	113	94	90	98
pans	84	74	91	63	66	75
Application 2						
pads	89	77	83	82	96	85
pans	81	86	65	95	80	82

Calculated from data obtained from Table 7, pp. 35 of the study report.

Difference between pad and pan prothioconazole application verification, as % of label rate (5.72 oz. a.i./A).

Application 1	A	B	C	D	E	AVR
Δ	-17	-23	-24	-35	-26	-25
Application 2						
Δ	-9	10	-19	15	-18	-4

Calculated from data obtained from Table 7, pp. 35 of the study report.

Difference between pad and pan prothioconazole application verification, as % of applied rate (6.3 oz. a.i./A).

Application 1	A	B	C	D	E	AVR
Δ	-15	-21	-22	-32	-24	-23
Application 2						
Δ	-8	9	-17	14	-16	-4

Calculated from data obtained from Table 7, pp. 35 of the study report.

Chemical Name Prothioconazole
 PC Code 113961
 MRID 46246518
 Guideline No. 164-1

Molecular weight:	amu
Prothioconazole	344.3
Prothioconazole-desthio	312.2
Prothioconazole-S-methyl	358.3
Prothioconazole- thiazocine	307.8
1,2,4-triazole	69.1

**Prothioconazole and transformation products expressed as concentrations.
 (0-15 cm; no detections >LOQ below 15 cm)**

Days	App. No.	Prothioconazole applied (ppb)	Prothioconazole (ppb)	Prothioconazole-desthio (ppb)	Prothioconazole-S-methyl (ppb)	Prothioconazole-thiazocine (ppb)	1,2,4-triazole (ppb)
-14	1	193.1	56.9	33.0	<MDL	<MDL	<MDL
-14	1	193.1	45.3	44.0	<MDL	<MDL	<MDL
-14	1	193.1	70.3	56.2	<MDL	<MDL	<MDL
-14 AVR	1	193.1	57.5	44.4	<MDL	<MDL	<MDL
0	2	386.3	67.7	81.6	7.1	<MDL	2.9
0	2	386.3	56.9	84.9	7.5	<MDL	3.9
0	2	386.3	60.0	79.5	6.9	<MDL	3.2
0 AVR	2	386.3	61.5	82.0	7.2	<MDL	3.3
2	n/a	386.3	2.5	51.1	2.5	<MDL	3.7
2	n/a	386.3	<MDL	53.1	1.2	<MDL	3.0
2	n/a	386.3	2.5	53.1	2.5	<MDL	3.1
2 AVR	n/a	386.3	2.5	52.4	2.1	<MDL	3.3
7	n/a	386.3	5.6	63.5	9.7	<MDL	3.4
7	n/a	386.3	4.7	73.0	8.3	<MDL	3.5
7	n/a	386.3	5.5	77.7	12.3	<MDL	4.0
7 AVR	n/a	386.3	5.3	71.4	10.1	<MDL	3.6
14	n/a	386.3	4.0	53.1	5.9	<MDL	4.0
14	n/a	386.3	<MDL	52.3	5.7	<MDL	4.0
14	n/a	386.3	3.9	55.0	6.6	<MDL	3.8
14 AVR	n/a	386.3	3.5	53.5	6.1	<MDL	3.3
28	n/a	386.3	<MDL	59.2	6.8	<MDL	4.2
28	n/a	386.3	<MDL	41.7	4.5	<MDL	4.5
28	n/a	386.3	<MDL	47.5	5.3	<MDL	5.1
28 AVR	n/a	386.3	<MDL	49.5	5.5	<MDL	4.6
61	n/a	386.3	<MDL	18.7	2.0	<MDL	4.0
61	n/a	386.3	<MDL	23.7	2.0	<MDL	3.3
61	n/a	386.3	<MDL	23.9	2.4	<MDL	3.6
61 AVR	n/a	386.3	<MDL	22.1	2.1	<MDL	3.6
90	n/a	386.3	<MDL	18.0	1.2	<MDL	3.0
90	n/a	386.3	<MDL	15.6	1.9	<MDL	3.1
90	n/a	386.3	<MDL	8.4	<MDL	<MDL	2.4
90 AVR	n/a	386.3	<MDL	14.0	1.4	<MDL	2.8
120	n/a	386.3	<MDL	5.1	<MDL	<MDL	4.3
120	n/a	386.3	<MDL	11.1	<MDL	<MDL	5.4
120	n/a	386.3	<MDL	6.5	<MDL	<MDL	5.0
120 AVR	n/a	386.3	<MDL	7.6	<MDL	<MDL	4.9
141	n/a	386.3	<MDL	9.4	1.5	<MDL	3.9
141	n/a	386.3	<MDL	10.2	<MDL	<MDL	4.5
141	n/a	386.3	<MDL	9.2	<MDL	<MDL	3.2
141 AVR	n/a	386.3	<MDL	9.6	1.3	<MDL	3.9
218	n/a	386.3	<MDL	9.2	<MDL	<MDL	2.5
218	n/a	386.3	<MDL	4.7	<MDL	<MDL	2.0
218	n/a	386.3	<MDL	15.1	<MDL	<MDL	2.8
218 AVR	n/a	386.3	<MDL	9.7	<MDL	<MDL	2.4
296	n/a	386.3	<MDL	9.8	<MDL	<MDL	2.2
296	n/a	386.3	<MDL	5.1	<MDL	<MDL	1.8
296	n/a	386.3	<MDL	7.2	<MDL	<MDL	1.9
296 AVR	n/a	386.3	<MDL	7.4	<MDL	<MDL	2.0
306	n/a	386.3	<MDL	4.2	<MDL	<MDL	2.4
306	n/a	386.3	<MDL	4.5	<MDL	<MDL	2.2
306	n/a	386.3	<MDL	3.1	<MDL	<MDL	2.1
306 AVR	n/a	386.3	<MDL	3.9	<MDL	<MDL	2.2
421	n/a	386.3	<MDL	<MDL	<MDL	<MDL	1.4
421	n/a	386.3	<MDL	<MDL	<MDL	<MDL	<MDL
421	n/a	386.3	<MDL	<MDL	<MDL	<MDL	<MDL
421 AVR	n/a	386.3	<MDL	<MDL	<MDL	<MDL	1.3
532	n/a	386.3	<MDL	<MDL	<MDL	<MDL	<MDL
532	n/a	386.3	<MDL	<MDL	<MDL	<MDL	<MDL
532	n/a	386.3	<MDL	3.6	<MDL	<MDL	<MDL
532 AVR	n/a	386.3	<MDL	3.0	<MDL	<MDL	<MDL

Data obtained from Tables 9-13, pp. 37-44, and calculated from data obtained from p. 26 of the study report.

LOQ= 10 ppb; MDL= 2.5, 2.7, 1.2, 1.8, and 1.3 ppb for prothioconazole, -desthio, -S-methyl, -thiazocine, and 1,2,4-triazole, respectively.

Chemical Name Prothioconazole
 PC Code 113961
 MRID 46246518
 Guideline No. 164-1

Prothioconazole and transformation products expressed as a percent of theoretically applied (6.3 oz. a.i./A) prothioconazole. (0-15 cm; no detections >LOQ below 15 cm)

Days	App. No.	Prothioconazole applied (ppb)	Prothioconazole (%)	Prothioconazole-desthio (%)	Prothioconazole-S-methyl (%)	Prothioconazole-thiazocine (%)	1,2,4-triazole (%)	TOTAL (%)
-14	1	193.1	29.5	18.8	<MDL	<MDL	<MDL	48.3
-14	1	193.1	23.5	25.1	<MDL	<MDL	<MDL	48.6
-14	1	193.1	36.4	32.1	<MDL	<MDL	<MDL	68.5
-14 AVR	1	193.1	29.8	25.3	<MDL	<MDL	<MDL	55.1
0	2	386.3	17.5	23.3	1.8	<MDL	3.7	46.3
0	2	386.3	14.7	24.2	1.9	<MDL	5.0	45.9
0	2	386.3	15.5	22.7	1.7	<MDL	4.1	44.1
0 AVR	2	386.3	15.9	23.4	1.8	<MDL	4.3	45.4
2	n/a	386.3	0.6	14.6	0.6	<MDL	4.8	20.6
2	n/a	386.3	<MDL	15.2	0.3	<MDL	3.9	19.3
2	n/a	386.3	0.6	15.2	0.6	<MDL	4.0	20.4
2 AVR	n/a	386.3	0.6	15.0	0.5	<MDL	4.2	20.1
7	n/a	386.3	1.4	18.1	2.4	<MDL	4.4	26.4
7	n/a	386.3	1.2	20.8	2.1	<MDL	4.5	28.6
7	n/a	386.3	1.4	22.2	3.1	<MDL	5.2	31.8
7 AVR	n/a	386.3	1.4	20.4	2.5	<MDL	4.7	28.9
14	n/a	386.3	1.0	15.2	1.5	<MDL	5.2	22.8
14	n/a	386.3	<MDL	14.9	1.4	<MDL	5.2	21.5
14	n/a	386.3	1.0	15.7	1.6	<MDL	4.9	23.3
14 AVR	n/a	386.3	0.9	15.3	1.5	<MDL	5.1	22.5
28	n/a	386.3	<MDL	16.9	1.7	<MDL	5.4	24.0
28	n/a	386.3	<MDL	11.9	1.1	<MDL	5.8	18.8
28	n/a	386.3	<MDL	13.6	1.3	<MDL	6.6	21.5
28 AVR	n/a	386.3	<MDL	14.1	1.4	<MDL	5.9	21.4
61	n/a	386.3	<MDL	5.3	0.5	<MDL	5.2	11.0
61	n/a	386.3	<MDL	6.8	0.5	<MDL	4.3	11.5
61	n/a	386.3	<MDL	6.8	0.6	<MDL	4.6	12.1
61 AVR	n/a	386.3	<MDL	6.3	0.5	<MDL	4.7	11.5
90	n/a	386.3	<MDL	5.1	0.3	<MDL	3.9	9.3
90	n/a	386.3	<MDL	4.5	0.5	<MDL	4.0	8.9
90	n/a	386.3	<MDL	2.4	<MDL	<MDL	3.1	5.5
90 AVR	n/a	386.3	<MDL	4.0	0.4	<MDL	3.7	7.9
120	n/a	386.3	<MDL	1.5	<MDL	<MDL	5.5	7.0
120	n/a	386.3	<MDL	3.2	<MDL	<MDL	7.0	10.1
120	n/a	386.3	<MDL	1.9	<MDL	<MDL	6.5	8.3
120 AVR	n/a	386.3	<MDL	2.2	<MDL	<MDL	6.3	8.5
141	n/a	386.3	<MDL	2.7	0.4	<MDL	5.0	8.1
141	n/a	386.3	<MDL	2.9	<MDL	<MDL	5.8	8.7
141	n/a	386.3	<MDL	2.6	<MDL	<MDL	4.1	6.8
141 AVR	n/a	386.3	<MDL	2.7	0.3	<MDL	5.0	7.9
218	n/a	386.3	<MDL	2.6	<MDL	<MDL	3.2	5.9
218	n/a	386.3	<MDL	1.3	<MDL	<MDL	2.6	3.9
218	n/a	386.3	<MDL	4.3	<MDL	<MDL	3.6	7.9
218 AVR	n/a	386.3	<MDL	2.8	<MDL	<MDL	3.1	5.9
296	n/a	386.3	<MDL	2.8	<MDL	<MDL	2.8	5.6
296	n/a	386.3	<MDL	1.5	<MDL	<MDL	2.3	3.8
296	n/a	386.3	<MDL	2.1	<MDL	<MDL	2.5	4.5
296 AVR	n/a	386.3	<MDL	2.1	<MDL	<MDL	2.5	4.6
306	n/a	386.3	<MDL	1.2	<MDL	<MDL	3.1	4.3
306	n/a	386.3	<MDL	1.3	<MDL	<MDL	2.8	4.1
306	n/a	386.3	<MDL	0.9	<MDL	<MDL	2.7	3.6
306 AVR	n/a	386.3	<MDL	1.1	<MDL	<MDL	2.9	4.0
421	n/a	386.3	<MDL	<MDL	<MDL	<MDL	1.8	1.8
421	n/a	386.3	<MDL	<MDL	<MDL	<MDL	<MDL	0.0
421	n/a	386.3	<MDL	<MDL	<MDL	<MDL	<MDL	0.0
421 AVR	n/a	386.3	<MDL	<MDL	<MDL	<MDL	1.7	0.6
532	n/a	386.3	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
532	n/a	386.3	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
532	n/a	386.3	<MDL	1.0	<MDL	<MDL	<MDL	1.0
532 AVR	n/a	386.3	<MDL	0.7	<MDL	<MDL	<MDL	0.7

Calculated from data obtained from Tables 9-13, pp. 37-44, and calculated from data obtained from p. 26 of the study report.
 LOQ= 10 ppb; MDL= 2.5, 2.7, 1.2, 1.8, and 1.3 ppb for prothioconazole, -desthio, -S-methyl, -thiazocine, and 1,2,4-triazole, respectively.