

**Data Evaluation Report on the terrestrial field dissipation of prothioconazole**

PMRA Submission Number 2004-0843

EPA MRID Number 46246519

**Data Requirement:** PMRA Data Code: 8.3.2  
 EPA DP Barcode: D303488  
 OECD Data Point: IIA 7.3, IIA 7.3.1, IIA 7.3.2, IIA 7.3.3, IIIA  
 9.2.1, IIIA 9.2.2, IIIA 9.2.3  
 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: ClC1(C(Cc2ccccc2Cl)(CN2N=CNC2=S)O)CC1.**Primary Reviewer:** Dan Hunt  
Dynamac Corporation**Signature:**  
**Date:****QC Reviewer:** Joan Harlin  
Dynamac Corporation**Signature:**  
**Date:****Secondary Reviewer:** Roxolana Kashuba  
EPA/OPP/EFED/ERB4**Signature:**  
**Date:** 06.30.2005**Secondary Reviewer:** Émilie Larivière  
HC/PMRA/EAD**Signature:**  
**Date:** 11.23.2005**Company Code** BCZ  
**Active Code** PRB  
**Use Site Category** 7, 13, 14  
**EPA PC Code** 113961

**CITATION:** Wood, S.E. 2004. Terrestrial field dissipation of JAU6476 in New York soil, 1999. Unpublished study performed by A & L Great Lakes Laboratories, Inc., Fort Wayne, IN, Bayer CropScience, Stilwell, KS and ACDS, Dundee, NY and submitted by Bayer CropScience, Research Triangle Park, NC. Submitting Laboratory Study No. J6022103. Bayer Report No. 200053. Experiment initiation July 13, 1999, and completion April 10, 2001 (field phase; p. 12). Final report issued March 5, 2004.



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**Primary Reviewer:** Dan Hunt  
Dynamac Corporation

**Signature:** *Dan Hunt*  
**Date:** 10-27-2004

**QC Reviewer:** Joan Harlin  
Dynamac Corporation

**Signature:** *Joan Harlin*  
**Date:** 10/27/04

**Secondary Reviewer:** John Ravenscroft  
EPA

**Signature:**  
**Date:**

**Company Code:**

**Active Code:**

**Use Site Category:**

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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 soil near North Rose, New York (Ecoregion 8.1- Mixed Wood Plains, reviewer-determined). 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 six times (at 14-day intervals) at a target application rate of 0.336 kg a.i./ha/application (4.8 oz a.i./A/application; 2.017 kg a.i./ha/season) in a test plot measuring 30 x 16 m (100 x 54 ft.). The test substance was applied at 110% of the proposed US label rate and 168% of the proposed Canadian label rate. Rainfall was supplemented with irrigation to reach 145% of the historical average rainfall for the same time period. A control plot was located approximately 49 m away from the treated plot.

The application rate was verified for each application 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 81.2%, 85.6%, 87.1%, 78.8%, 88.0%, 84.0% of the applied amount (4.8 oz. a.i./A) (89.4%, 94.2%, 95.9%, 86.7%, 96.9%, and 92.5% of the label rate (4.36 oz. a.i./A)) for the first through sixth applications, respectively. Corresponding recoveries from the soil pans were 93.0%, 78.0%, 78.4%, 80.2%, 80.1%, 79.0% of the applied amount (102.4%, 85.8%, 86.3%, 88.3%, 88.2%, and 87.0% of the label rate) for the first through sixth applications, respectively. Field spikes were prepared for the transformation products JAU6476-desthio, JAU6476-S-methyl, and 1,2,4-triazole at 50 µg/kg. Recoveries from field spikes were 83% for JAU6476-desthio, 91% for JAU6476-S-methyl, and 74% for 1,2,4-triazole following 1211 days of storage. Field spikes were not prepared for prothioconazole and JAU6476 thiazocine.

Soil samples were taken immediately following each of the six applications (at -70, -56, -42, -28, -13, 0 days, respectively) and at 3, 7, 14, 28, 58, 162, 211, 301, 422, and 567 days after the sixth application to a depth of 0-120 cm (except application 1, day 0 (at -71 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 1067 days prior to analysis. The LOQ was 10 µg/kg for all compounds in soil. The MDLs were 3.1, 1.8, 0.4, 1.4, and 3.0 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 -71 days) was 64.4 µg/kg, which is 38.5 % of the theoretical applied

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concentration, 167.4 µg/kg (42.4% of the theoretical concentration if applied at label rate, 152 µg/kg). Mean concentrations of prothioconazole in the 0-15 cm soil depth following the second through fifth applications were 67.8 µg/kg, 82.8 µg/kg, 72.5 µg/kg, and 66.9 µg/kg, respectively. Following the sixth application, prothioconazole was detected in the 0-15 cm soil depth at a maximum mean concentration of 70.7 µg/kg at day 0, decreased to 13.6 µg/kg by 3 days, and was last detected above the LOQ at 10.6 µg/kg (single replicate) at 14 days posttreatment. Prothioconazole was not detected below the 0-15 cm soil depth. One major transformation product, JAU6476-desthio, was detected in the 0-15 cm soil depth at a maximum mean concentration of 221.1 µg/kg (24.3% of applied parent) by 58 days post sixth application, then decreased to 82.5 µg/kg (9.1% of applied parent) by the end of the study (567 days post sixth application). Two minor transformation products, JAU6476-S-methyl and 1,2,4-triazole, were detected in the 0-15 cm soil depth. JAU6476-S-methyl was detected at a maximum mean concentration of 46.9 µg/kg (4.5% of applied parent) by 7 and 422 days post sixth application, then decreased to 4.0 µg/kg (0.4% of applied parent), by the end of the study (567 days post sixth application). 1,2,4-triazole was not detected above the LOQ at any sampling interval, but was detected above the MDL at a maximum mean concentration of 3.3 µg/kg (1.7% of applied parent) at 422 days post sixth application, and decreased to 3.1 µg/kg (1.5% of applied parent), by the end of the study (567 days post sixth application). Prothioconazole, JAU6476-desthio, JAU6476-S-methyl, and 1,2,4-triazole were not detected above the LOQ in soil below 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 96.3 days ( $r^2 = 0.3801$ ), calculated using linear regression on log-transformed data, based on residues in the 0-15 cm soil depth; however, the dissipation of prothioconazole was biphasic with an initial rapid decline phase occurring through approximately 3 days, followed by a slower decline phase to the end of the study period. The observed  $DT_{50}$  value was <3 days. An observed  $DT_{90}$  value occurred between 28-211 days. The  $DT_{50}$  and  $DT_{90}$  calculated by the PMRA reviewer using non-linear regression of ln-transformed data were 3.1 and 77 days, respectively. At the end of the study period, 567 days after the sixth application, the total carryover of the parent and transformation products was 0% and 10.1% of the total applied prothioconazole (based on six applications), respectively.

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

### RESULTS SYNOPSIS

Location/soil type: North Rose, New York/Loamy sand soil (0-180 cm).

Prothioconazole  $DT_{50}$  (observed): <3 days.

Prothioconazole  $DT_{50}$  (calculated with non-linear regression of ln transformed data): 3.1 days

Prothioconazole half-life ( $t_{1/2}$ , calculated with log-linear regression): 96.3 days.

Prothioconazole  $DT_{90}$  (observed): 28-211 days.

Prothioconazole  $DT_{50}$  (calculated with non-linear regression of ln transformed data): 77 days

Major transformation products detected: JAU6476-desthio and JAU6476-S-methyl.

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Dissipation routes: Transformation.

JAU6476-desthio half-life (DT<sub>50</sub>, observed): 301-422 days.

JAU6476-desthio half-life (t<sub>1/2</sub>, calculated): 315.1 days.

JAU6476-desthio DT<sub>90</sub> (observed): >567 days.

JAU6476-S-methyl half-life (DT<sub>50</sub>, observed): 28-301 days.

JAU6476-S-methyl half-life (t<sub>1/2</sub>, calculated): 147.5 days.

JAU6476-S-methyl DT<sub>90</sub> (observed): >422 days.

**Study Acceptability:** This study is classified **supplemental** by the U.S. EPA for a terrestrial field dissipation study because prothioconazole was not stable in frozen storage. The PMRA uses a different classification scheme than the one used by the U.S. EPA. **This** field dissipation study is classified acceptable to the PMRA.

Two separate storage stability studies were submitted for prothioconazole, JAU6476-desthio and JAU6476-S-methyl (Summer, 2002) and 1,2,4-triazole (Shadrick *et al.* 1999). Results showed that prothioconazole, JAU6476-desthio and JAU646-S-methyl are stable under deep-frozen conditions ( $\leq -18^{\circ}\text{C}$ ) for at least 770 days and that 1,2,4-triazole in soil stored under frozen conditions remained stable for 42 months. However, at ambient temperature, prothioconazole degraded quickly to JAU6476-desthio and to traces of JAU6476-S-methyl. (The amounts that could be recovered from soil depended on the time between spiking of the soil samples and the deep-freezing.)

### 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 CFR 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. 11).

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### Chemical Structure

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

**Description:** White powder (Table 1, p. 28).

**Storage conditions of test chemicals:** Ambient (p. 13).

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

Parameter	Values	Comments
Chemical Formula	C <sub>14</sub> H <sub>15</sub> Cl <sub>2</sub> N <sub>3</sub> OS	
Molecular weight	344.27	
Water solubility	89 mg/L	At 23°C, buffer pH 7.
Vapour pressure/volatility	Not reported	
UV absorption	Not reported	
pKa	Not reported	
K <sub>ow</sub> /log K <sub>ow</sub>	pH 2: Log Kow = 3.33 pH 7.5: Log Kow = 1.95	At 20°C. At 20°C.
Stability of Compound at room temperature	Not reported	

Data were obtained from Table 1, p. 28 of the study report.

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**2. Test site:** The test site was located near North Rose, Wayne County, New York, in a region representative of turf and vegetable production in the United States (p. 12; Figures 2-4, pp. 51-53). The soil at the test site was classified as a Oakville loamy fine loam and consisted of loamy sand from 0 to 180 cm (Table 3, p. 30). A three year plot history is reported in Table 2 below.

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

Details		Test site
Geographic coordinates	Latitude	N 43° 11.494'
	Longitude	W 76° 55.319'
	Province/State	New York
	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 at a weather station located approximately 6 miles west of the test site.
Indicate whether the meteorological conditions before starting or during the study were within 30 year normal levels (Yes/No). If no, provide details.		Total water input (precipitation plus irrigation) during the study period was 95.8 inches or 145% of the historical average precipitation for the same period.

Data were obtained from pp. 12, 15 and 23, and Table 5, p. 32 of the study report.

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

Use	Year	Test site
Crops grown	Previous year	Sweet corn
	2 years previous	Strawberries
	3 years previous	Alfalfa, field corn, bulb onions, and dry beans.
Pesticides used	Previous year	Prowl 3.3 EC Weedar 64 3.8 EC Bicep Lite II 4.9 L Warrior 1 EC
	2 years previous	Devrinol 50 WP Stinger 3 EC Sinbar 80 WP Roundup 4 EC
	3 years previous	Balan 1.5 EC Aztec 2.1 G Prowl 4 EC Buctril 2 EC Goal 1.6 EC Warrior 1 EC Treflan 4 EC Reflex 2L Touchdown Dual 8 EC Sencor 75 DF Gramoxone 2.5S Poast Plus Rovral 4 F Basagran 4 EC
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. 29 of the study report.



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### 3. Soils:

Table 3: Properties of the soil from the test site (Oakville 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	LS	LS	LS	LS	LS	LS	LS
% sand	77.2	77.2	75.2	77.2	79.2	79.2	75.2	77.2	79.2	77.2
% silt	18.4	18.4	20.4	18.4	16.4	16.4	20.4	18.4	16.4	18.4
% clay	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
pH	6.4	6.4	5.7	5.7	5.8	5.5	6.2	5.8	5.7	5.9
Total organic matter (%)	3.38	1.96	1.03	0.69	0.59	0.39	1.32	1.72	1.32	1.47
CEC (meq/100 g)	5.05	3.71	1.96	4.48	1.32	1.20	3.48	1.93	1.46	5.65
Bulk density (g/cm <sup>3</sup> )	1.32	1.39	1.41	1.45	1.46	1.46	1.46	1.45	1.47	1.54
Moisture at 1/3 atm (%)	9.74	8.52	7.66	6.54	6.70	6.24	5.60	5.89	5.12	7.16
Taxonomic classification (e.g., ferro-humic podzol)	Mixed, mesic Typic Udipsamments									
Soil mapping unit	Not reported									

Data were obtained from Table 3, p. 30 of the study report. LS = Loamy sand.

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## B. EXPERIMENTAL DESIGN:

### 1. Experimental design:

Table 4: Experimental design.

Details		Test site
Duration of study		637 days (567 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 16.4 m, divided into five equal sections for sampling.
Distance between control plot and treated plot		48.8 m
Distance between treated plots		Not reported
Application rate(s) used (g a.i./ha)		336 g a.i./ha/application (4.8 ounces a.i./A/application)
Was the maximum label rate per ha used in study? (Yes/No)		The application rate was 110% of a 4.32 ounces a.i./A proposed label rate. The 480SC label has a maximum proposed label rate of 2.85 ounces a.i./A.
Number of applications		Six
Application Date(s) (dd mm yyyy)	<b>Application 1</b>	13/07/1999
	<b>Application 2</b>	27/07/1999
	<b>Application 3</b>	10/08/1999
	<b>Application 4</b>	24/08/1999
	<b>Application 5</b>	08/09/1999
	<b>Application 6</b>	21/09/1999
For multiple applications, application rate at Day 0 and at each application time (mg a.i./kg soil) <sup>1</sup>		0.167 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 9 flat fan 8008 nozzles (spaced 20 inches apart and set 18-25 inches above the ground).
Total volume of spray solution applied/plot <b>OR</b> total		

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Details		Test site					
amount broadcasted/plot		Approximately 25 gal/A for each application.					
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 Average minimum and maximum air temperature Average minimum and maximum soil temperature Average annual frost-free periods		Yes Yes No, mean only (at 2- and 6-inch depth) No (number of frost days per month was reported)					
Indicate whether the Pan evaporation data were submitted		No					
Meteorological conditions during application	<b>Application</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
	Cloud cover	0-5%	10-15%	80%	30%	50%	100%
	Temperature (°C)	15.0	22.2	11.7	16.1	19.4	9.4
	Humidity	94%	80%	98%	99%	100%	100%
	Wind speed (mph) and direction	0-1.3, SW	0-1, S	0	1-3, S	0	0-1, NW
	Sunlight (hr)	Not reported					
Pesticides used during study:							
name of product/a.i concentration: amount applied: application method:		Gramoxone/Gramoxone Extra Two applications at 3 pt/A Not reported					
name of product/a.i concentration: amount applied: application method:		Roundup Three applications at 2-3 qt/A Not reported					
name of product/a.i concentration: amount applied: application method:		Simazine One application at 1 qt/A Not reported					
name of product/a.i concentration: amount applied: application method:		Touchdown One application at 1.5 qt/A Not reported					
name of product/a.i concentration: amount applied: application method:		Princep One application at 1 qt/A Not reported					

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Details	Test site
name of product/a.i concentration: amount applied: application method:  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:	Prowl One application at 3 qt/A Not reported  Yes; however, daily irrigation events were not reported. Monthly irrigation totals ranged from 1.23 to 4.5 inches. Irrigation was supplied by an overhead sprinkler.
Indicate whether water received through rainfall + irrigation equals the 30 year average rainfall (Yes/No)	Total water input was 145% of the historical average for the same time period.
Were the application concentrations verified? (Briefly describe in Section 2 <sup>*</sup> , if used)	Yes
Were field spikes used? (Briefly describe in Section 3 <sup>†</sup> , 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 <sup>§</sup> )	No
Leaching included in the study (Yes/No) (if included, describe in Section 5 <sup>i</sup> )	Yes
Run off included in the study (Yes/No) (if included, describe in Section 6 <sup>¶</sup> )	No

Data were obtained from pp. 13-15; Tables 4-6, pp. 31-33; and Appendix 2, pp. 85-104 of the study report. The test plots were cultivated prior to the first application using a 5-inch subsoiler and cultimulcher then rolled and packed (p. 13).

<sup>†</sup> The application rate at day 0, reported as mg a.i./kg soil, was partially calculated by the registrant and is based on the site-specific bulk density of the 0-15 cm soil depth (1.32 g/cm<sup>3</sup>) and the application rate of 4.8 oz a.i./A (p. 25).

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**2. Application Verification:** The application rate was verified for each application using solvent saturation pads and soil pans (pp. 13-14). 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 were extracted three times by shaking for 30 minutes, once with 100 mL of 0.01% L-cysteine hydrochloride and 100 mL of acetonitrile, and twice with 160 mL of acetonitrile:water (1:1, v:v; p. 16 and Appendix 3, pp. 105-107). The extracts were combined, brought to volume with acetonitrile:water (1:1, v:v), and an aliquot was filtered (0.45 µm 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-µm; mobile phase of 0.1% phosphoric acid:acetonitrile, 55:45, v:v).

Metal pans (12-in diameter) containing approximately 400 g of sieved (2 mm) soil from the control plot were also placed in each section of the test plot prior to each application (5 pans total for each application; p. 14). 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. 17-18; Appendix 4, pp. 111-113). 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 µm 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-µm; mobile phase of 0.1% phosphoric acid:acetonitrile, 55:45, v:v).

**3. Field Spiking:** Field spikes were prepared at selected sampling intervals for JAU6476-desthio, JAU6476-S-methyl, and 1,2,4-triazole (p. 15; Table 15, p. 47). Soil samples were fortified with each analyte at 50 µg/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 days of storage. 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 immediately following each of the six applications and at 3, 7, 14, 28, 58, 162, 211, 301, 422, and 567 days after the sixth application to a depth of 120 cm (except application 1, day 0 (day -70) samples which were collected to a depth of 15 cm) to determine the mobility of the test substance in the soil profile (pp. 14-15; Table 4, p. 31). Total water input for the first month of the study (July 1999, prorated) was 1.8 inches or 87.6% of the historical average (Table 5, p. 32).

**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, JAU6476-thiazocine, and 1,2,4-

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triazole in soil, samples were fortified with JAU6476-desthio, JAU6476-S-methyl, and 1,2,4-triazole at 50 µg/kg and with prothioconazole and JAU6476-thiazocine at 100 µg/kg (p. 23; Table 15, p. 47). Samples were analyzed for prothioconazole following 646 days of storage, for JAU6476 thiazocine following 646 and 883 days of storage, for JAU6476-desthio and JAU6476-S-methyl following 806 and 1211 days of storage, and for 1,2,4-triazole following 1211 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. 21).

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. 25).

### 8. Sampling:

Table 5: Soil sampling.

Details	Test site
Method of sampling (random or systematic)	Random
Sampling intervals	Immediately following each of the six applications and at 3, 7, 14, 28, 58, 162, 211, 301, 422, and 567 days after the sixth 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 collected only 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 1067 days.

Data were obtained from pp. 14-16; Table 4, p. 31; and Tables 9-13, pp. 36-45 of the study report.

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**9. Analytical Procedures:** Soil samples were 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), 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. 11 and 18, and Figure 1, pp. 48-50). 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. 18-19; Appendix 5, pp. 118-120). 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- $\mu$ L aliquot was diluted with 300  $\mu$ L of water. The extracts were analyzed by HPLC (Luna C18 column, 100 x 4.6 mm, 5  $\mu$ ) 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. 20; Appendix 6, pp. 126-129). 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- $\mu$ m nylon Acrodisc. The extracts were analyzed by HPLC (Luna C18 column, 100 x 4.6 mm, 5  $\mu$ ) 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  $\mu$ g/g for all compounds in soil and the method detection limit (MDL) was 3.1  $\mu$ g/kg for prothioconazole, 1.8  $\mu$ g/kg for JAU6476-desthio, 0.4  $\mu$ g/kg for JAU6476-S-methyl, 1.4  $\mu$ g/kg for JAU6476 thiazocine, and 3.0  $\mu$ g/kg for 1,2,4-triazole (pp. 21 and 24).

## II. RESULTS AND DISCUSSION

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**1. APPLICATION MONITORS:** Mean recoveries of prothioconazole from the soil pads were 81.2%, 85.6%, 87.1%, 78.8%, 88.0%, 84.0% of the applied amount (4.8 oz. a.i./A; 110% of label rate) based on the field application calculations for the first through sixth applications, respectively (calculated from Table 7, p. 34). Corresponding recoveries as a percent of the label rate (4.36 oz. a.i./A) were 89.4%, 94.2%, 95.9%, 86.7%, 96.9%, and 92.5% (Table 7, p. 34). Mean recoveries of prothioconazole from the soil pans were 93.0%, 78.0%, 78.4%, 80.2%, 80.1%, 79.0% of the applied amount (4.8 oz. a.i./A; 110% of label rate) based on the field application calculations for the first through sixth applications, respectively (calculated from Table 7, p. 34). Corresponding recoveries as a percent of the label rate (4.36 oz. a.i./A) were 102.4%, 85.8%, 86.3%, 88.3%, 88.2%, and 87.0% (Table 7, p. 34).

**2. RECOVERY FROM FIELD SPIKES:** Recoveries from field spikes prepared for JAU6476-desthio, JAU6476-S-methyl, and 1,2,4-triazole at 50 µg/kg were 83%, 91%, and 74%, respectively, following 1211 days of storage (Table 15, p. 47). 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.



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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 (-70)	App 2 (-56)	App 3 (-42)	App 4 (-28)	App 5 (-13)	App 6 (0)	3	7	14	28	58	162	211	301	422	567	
Prothioconazole (JAU6476)	0-15 reps	58.4	68.7	81.0	65.2	60.5	57.6	13.0	12.1	(8.8)	(9.0)	(5.5)	(4.2)	(5.1)	ND	ND	ND	
		62.3	68.7	88.7	74.6	58.4	76.3	14.4	11.2	10.6	(6.2)	(3.3)	ND	(3.1)				
		72.4	66.0	78.6	77.7	81.7	78.2	13.5	11.2	(8.7)	(8.5)	(6.5)	(7.1)	(4.4)				
	Mean	<b>64.4</b>	<b>67.8</b>	<b>82.8</b>	<b>72.5</b>	<b>66.9</b>	<b>70.7</b>	<b>13.6</b>	<b>11.5</b>	<b>(9.4)</b>	<b>(7.9)</b>	<b>(5.1)</b>	<b>(4.8)</b>	<b>(4.2)</b>				
	15-30	NS	ND	ND	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	ND	ND
JAU6476-desthio	0-15 reps	19.7	60.6	108.5	112.8	116.0	183.8	218.1	236.5	206.6	221.3	218.2	221.9	188.9	118.4	103.0	91.2	
		22.2	58.9	150.9	120.1	155.2	215.6	216.1	200.7	224.2	166.7	NA	202.7	169.3	121.9	84.0	74.3	
		28.5	51.3	106.2	126.7	193.6	194.3	195.7	219.6	227.3	273.0	223.9	226.6	183.7	97.9	68.1	76.0	
	Mean	<b>23.5</b>	<b>56.9</b>	<b>121.9</b>	<b>119.9</b>	<b>154.9</b>	<b>197.9</b>	<b>210.0</b>	<b>218.9</b>	<b>219.4</b>	<b>220.3</b>	<b>221.0</b>	<b>217.1</b>	<b>180.6</b>	<b>112.7</b>	<b>85.0</b>	<b>82.5</b>	
	15-30 reps	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	Mean													ND ND (3.8) (2.5)				
30-45	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
JAU6476-S-methyl	0-15 reps	ND	(8.6)	21.3	22.0	22.9	37.0	40.6	49.8	43.1	45.5	35.8	30.1	22.9	(7.8)	(8.1)	(5.3)	
		(0.4)	10.4	28.9	23.4	33.9	42.6	46.4	44.5	46.2	34.6	15.7	21.4	19.1	11.6	(4.2)	(2.9)	
		(0.5)	(9.9)	20.9	26.8	39.1	38.5	39.5	46.4	50.0	58.9	36.9	34.6	26.6	(6.2)	(3.9)	(3.9)	
	Mean	<b>(0.4)</b>	<b>(9.6)</b>	<b>23.7</b>	<b>24.1</b>	<b>32.0</b>	<b>39.4</b>	<b>42.2</b>	<b>46.9</b>	<b>46.4</b>	<b>46.3</b>	<b>29.5</b>	<b>28.7</b>	<b>22.9</b>	<b>(8.5)</b>	<b>(5.4)</b>	<b>(4.0)</b>	
	15-30	NS	ND	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	ND	
JAU6476 thiazocine	0-15	ND	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	ND	

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Compound	Soil depth (cm)	Sampling times (days following the last application)															
		App 1 (-70)	App 2 (-56)	App 3 (-42)	App 4 (-28)	App 5 (-13)	App 6 (0)	3	7	14	28	58	162	211	301	422	567
1,2,4-triazole	30-45	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	0-15	ND	ND	ND	ND	ND	ND	ND	(3.1) ND ND (3.0)	(3.0) (3.3) (3.1) (3.0)	ND	ND	ND	ND	ND	(3.3) (3.2) (3.5) (3.3)	(3.2) ND (3.1)
	15-30	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	30-45	NS	ND	ND	ND	ND	ND	ND									

Data were obtained from Tables 9-13, pp. 36-45 of the study report. The LOQ was 10 µg/kg. Values in parenthesis are below the LOQ (10 µg/kg) and above the MDL (3.1, 1.8, 0.4, 1.4, and 3.0 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.

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**4. PARENT COMPOUND:** The mean concentration of prothioconazole in the 0-15 cm soil depth following the first application (at -71 days) was 64.4 µg/kg, which is 38.5 % of the theoretical applied concentration, 167.4 µg/kg (42.4% of the theoretical concentration if applied at label rate, 152 µg/kg) (calculated from p. 25; Table 9, p. 36). Mean concentrations of prothioconazole in the 0-15 cm soil depth following the second through fifth applications were 67.8 µg/kg, 82.8 µg/kg, 72.5 µg/kg, and 66.9 µg/kg, respectively. Following the sixth application, prothioconazole was detected in the 0-15 cm soil depth at a maximum mean concentration of 70.7 µg/kg at day 0, decreased to 13.6 µg/kg by 3 days, and was last detected above the LOQ at 10.6 µg/kg (single replicate) at 14 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 96.3 days ( $r^2 = 0.3801$ ), calculated using linear regression on all available individual replicate log-transformed prothioconazole concentrations (0-15 cm soil depth). The observed DT50 was <3 days. The observed DT90 occurred between 28-211 days. However, the dissipation of prothioconazole was biphasic, with an initial rapid decline phase occurring through approximately 3 days, followed by a slower decline phase to the end of the study period.

**5. TRANSFORMATION PRODUCTS:** The 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 26.8% of the applied parent (121.9 µg/kg), observed before the maximum total application, on the day of the third application (-42 days) in the 0-15 cm soil layer (Table 10, pp. 38-39). The maximum mean concentration observed after all six applications had been applied was 24.3% of applied parent (221.0 µg/kg) 58 days post sixth application in the 0-15 cm soil layer. JAU6476-desthio was initially detected in the 0-15 cm soil depth at a mean of 23.5 µg/kg (15.5% of applied parent) immediately following the first application, increased to a mean of 197.9 µg/kg (21.7% of applied prothioconazole) following the sixth application, was at a maximum concentration of 221.0 µg/kg (24.3% of applied parent) by 58 days, and decreased to 82.5 µg/kg (9.1% of applied parent) by the end of the study period (567 days post sixth 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 315.1 days ( $r^2 = 0.8180$ ), 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 (28DAT). The observed DT<sub>50</sub> occurred between 301-422 days. The observed DT<sub>90</sub> was >567 days.

The transformation product **JAU6476-S-methyl** (alpha-1(1-chlorocyclopropyl)-alpha-[(2-chlorophenyl)methyl]-3-(methylthio)-1H-1,2,4-triazole-1-ethanol) was not detected above 10% of the applied prothioconazole, but was detected at levels above the LOQ (10 µg/kg) from the time of the second application through 301 days post sixth application. JAU6476-S-methyl was initially detected in the 0-15 cm soil depth above the LOQ at 10.4 µg/kg (3.0% of applied parent) (single replicate) immediately following the second application. JAU6476-S-methyl increased to a maximum mean of 46.9 µg/kg (4.5% of applied parent) at 7 days following the sixth application, then decreased to a mean of 22.9 µg/kg (2.2% of applied parent) by 211 days

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posttreatment, and was detected at a mean concentration below the LOQ from 301-567 days, decreasing to 4.0 µg/kg (0.4% of applied parent) by the end of the study period (567 days post sixth application). JAU6476-S-methyl was not detected above the LOQ in soil below the 0-15 cm depth. The  $t_{1/2}$  value for JAU6476-S-methyl was 147.5 days ( $r^2 = 0.8489$ ), 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 (28DAT). The observed  $DT_{50}$  occurred between 28-301 days. The observed  $DT_{90}$  was >422 days.

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 sporadically at levels below the LOQ but above the MDL in the 0-15 cm soil depth, with a maximum concentration of 3.3 µg/kg (1.7% of applied parent) at 422 days after the sixth application, and a final concentration of 3.1 µg/kg (1.5% of applied parent) at the end of the study period (567 days post sixth application). 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-hydroxypropyl]-1,2-dihydro-3H-1,2,4-triazole	C <sub>14</sub> H <sub>15</sub> Cl <sub>2</sub> N <sub>3</sub> O	312.2	See Attachment 1
JAU6476-S-methyl	NA	Alpha-1(1-chlorocyclopropyl)-alpha-[(2-chlorophenyl)methyl]-3-(methylthio)-1H-1,2,4-triazole-1-ethanol	C <sub>15</sub> H <sub>17</sub> Cl <sub>2</sub> N <sub>3</sub> 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 <sub>14</sub> H <sub>14</sub> N <sub>3</sub> ClOS	307.8	See Attachment 1
1,2,4-triazole	NA	1-H-1,2,4-triazole	C <sub>2</sub> H <sub>3</sub> N <sub>3</sub>	69.1	See Attachment 1

Data were obtained from Figure 1, pp. 48-50 of the study report.

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

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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 <sup>1</sup>	0%
Transformation <sup>1</sup>	10.0% (9.1% as JAU6476-desthio, 1.5% as 1,2,4-triazole)
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
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. 36-45 of the study report.

<sup>1</sup> Calculated as a percent of the total applied prothioconazole, based on six applications (167 µg a.i./kg x 6 applications = 1004.2 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. 36-45).

**10. RUN OFF:** Run off was not studied.

**11. RESIDUE CARRYOVER:** At the end of the study period, 567 days after the sixth application, the total carryover of the parent and transformation products was 0% and 10.0% of the total applied prothioconazole (based on six applications), respectively (Tables 9-13, pp. 36-45). JAU6476-desthio accounted for 90.8% of the residues detected at the end of the study period. Observed DT<sub>90</sub> values 28-211 days, >567 days, and >422 days for prothioconazole, prothioconazole-desthio, and prothioconazole-S-methyl, respectively.

**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 to determine initial recoveries, and were analyzed only at one or two time points (Table 15, p. 47). Recovery of prothioconazole was 43% following 646 days, recovery of JAU6476 thiazocine was 84-93% following 646-883 days, recovery of JAU6476-desthio was 77-

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88% following 806-1211 days, recovery of JAU6476-S-methyl was 72-95% following 806-1211 days, and recovery of 1,2,4-triazole was 65% following 1211 days.

Mean recoveries for the additional method validation study at the 10 µg/kg fortification level were 98.1%, 103.0%, 101.6%, 99.7%, and 100.3% for prothioconazole, JAU6476-desthio, JAU6476-S-methyl, JAU6476 thiazocine, and 1,2,4-triazole, respectively (p. 24; Table 8, p. 35). Mean recoveries at the 100 µg/kg fortification level were 97.7%, 95.6%, 93.5%, 96.9%, and 81.5% for prothioconazole, JAU6476-desthio, JAU6476-S-methyl, JAU6476 thiazocine, and 1,2,4-triazole, respectively.

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 99-103% for prothioconazole, 93-102% for JAU6476-desthio, 93-99% for JAU6476-S-methyl, 95-99% for JAU6476 thiazocine, and 84-95% for 1,2,4-triazole (p. 25).

### 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 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 43% following 646 days of storage (Table 15, p. 47). In this study, prothioconazole was in storage up to 1065 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 or 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 -71 days) accounted for only 53.9% of the applied amount (38.5% as prothioconazole and 15.5% as JAU6476-desthio, calculated from p. 25; Tables 9, 10, p. 36, 38), whereas recoveries from soil pads and pans report that the test compound was applied at an average of 81.3-92.9% of the theoretical target application amount (calculated from Table 7, p. 34). No other transformation products were detected above the LOQ immediately following the first application. This suggests that residues could have been lost from field

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samples during storage, which was 1064 days for the -71 days sampling interval (directly after the first application) (Tables 9-10, pp. 36-39). 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 <sup>14</sup>C-labeled prothioconazole to soil, control soil was fortified and immediately analyzed for the parent, and that the time zero recovery indicated that 27% of the applied radioactivity was bound to the soil (pp. 23 and 26).

The stability of the transformation products JAU6476-desthio, JAU6476-S-methyl, and 1,2,4-triazole was reported 83%, 91%, and 74%, respectively, after 1211 days of storage, based on recoveries from field spikes that were fortified in the laboratory then sent to the field site and kept under the same conditions as the field samples. JAU6476-thiazocine was reported 84-93% 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. For example, 19.7 µg/kg of JAU6476-desthio (detection at day -70, 0-6 in. soil depth, first replicate) is converted to 21.7 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 (167.3 µg a.i./kg; calculated based on the site-specific bulk density of the 0-15 cm soil depth (1.32 g/cm<sup>3</sup>) and the applied rate (4.8 oz a.i./A, i.e., 110% of label rate)). For example, for JAU6476-desthio, 21.7 µg/kg parent equivalents (detection at day -70, 0-15 cm soil depth, first replicate; see above calculation) divided by 167.3 µg a.i./kg = 0.155 or 15.5% 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 (4.36 oz a.i./A), instead of theoretically applied rate, to obtain a labelled rate concentration of 152.0 µg a.i./kg. For example, for JAU6476-desthio, 21.7 µg/kg parent equivalents (detection at day -70, 0-15 cm soil depth, first replicate; see above calculation) divided by 152.0 µg a.i./kg = 0.170 or 17.0% of the labelled rate of prothioconazole, based on one application.

3. 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. 14 and 24).

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4. While this study used a 14-day re-application interval, the current proposed label allows re-application in as little as 5-day intervals. It is possible that the field dissipation pattern of prothioconazole may be altered, if applied at shorter intervals.
5. It is not initially clear whether application rate is reported in ounces formulation per acre (as implied in Field Procedures (p. 13)) or ounces active ingredient per acre (as stated in Summary (p. 10)). Neither interpretation of the application rate correlates to the current proposed US or Canadian labels. An application rate of 0.336 g a.i./ha is 168% of the proposed Canadian label rate.

US label

		Single	Max	# apps.
	Form.	oz. ai/A	oz. ai/A	
Max proposed label rate	480SC	2.85	11.40	4
NY: if 4.8 is oz. formulation/A	250SC	1.26	7.57	6
NY: if 4.8 is oz. a.i./A	250SC	4.80	28.80	6

Canadian label

		Single	Max	# apps.
	Form.	kg ai/ha	kg ai/ha	
Max proposed label rate	480SC	0.2	0.6	3
NY: if 4.8 is oz. formulation/A	250SC	0.088	0.53	6
NY: if 4.8 is oz. a.i./A	250SC	0.336	2.017	6

6. Application verification was extremely variable after the first application; the difference between pads and pans is not consistent (for example, Application 1: 23.0-55.9% of applied (36.8-63.0% of label rate) difference between pad and pan application at the same section, with neither consistently higher. Recoveries for Application 1 were as low as 47.3% and as high as 121.1% of applied (52.1% and 133.3% of label rate, respectively).) It remains questionable whether there was consistent application on the test field.
7. It is unclear why Figure 6 (p. 55) depicts a “Treated Turf Plot,” when the dissipation study appears to have been conducted on only the “Treated Bare Soil Plot” in the figure.
8. The EPA reviewer notes that two additional field dissipation studies were conducted on bare plots in the U.S., one following six applications of the test substance at a test site in California (MRID 46246517) and one following two applications of the test substance at a



## Data Evaluation Report on the terrestrial field dissipation of prothioconazole

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test site in Georgia (MRID 46246518). The PMRA reviewer notes that two additional field dissipation studies were conducted on bare plots in Canada, following a single application of JAU6476 250SC at a site in Minto Manitoba (Lenz, 2004a; Bayer Report No. 200096) and at a site in Saskatoon, Saskatchewan (Lenz, 2004b; Bayer Report No. 200134).

9. The ecoregion was not reported by the study author, but North Rose in Wayne County, New York, appears to be in Ecoregion 8.1, Mixed Wood Plains, from looking at a map of Ecoregions. This region is representative of Canadian conditions and is therefore acceptable to the PMRA.
10. The PMRA reviewer calculated the DT<sub>50</sub> and DT<sub>90</sub> using non-linear regression of log-transformed data, as well as through visual observation of the dissipation curve. The results obtained were the following:

Multi-compartment model of exponential decay			observed DT <sub>50</sub> from curvilinear interpolation (days)	observed DT <sub>90</sub> from curvilinear interpolation (days)
DT <sub>50</sub> and DT <sub>90</sub> (days)	Regression equation $y = a \cdot \exp(-b \cdot x) + c \cdot \exp(-d \cdot x)$	r <sup>2</sup>		
DT <sub>50</sub> = 3.1 DT <sub>90</sub> = 76.8	a=84.1494 b=292079527.61361 c=15.8506 d=0.0060	0.9891	<3	~33

11. Separate storage stability studies were submitted for prothioconazole, JAU6476-desthio and JAU6476-S-methyl (Summer, 2002) and 1,2,4-triazole (Shadrick *et al.* 1999) and showed that prothioconazole, JAU6476-desthio and JAU646-S-methyl are stable under deep-frozen conditions for at least 770 days and that 1,2,4-triazole stored under frozen conditions remained stable for 42 months. However, prothioconazole could only be stabilized in frozen soil ( $\leq -18^\circ\text{C}$ ). At ambient temperature, prothioconazole degraded quickly to JAU6476-desthio and to traces of JAU6476-S-methyl. (The amounts that could be recovered from soil depended on the time between spiking of the soil samples and the deep-freezing.) The longer the samples were stored at room temperature, the lower the recovered amounts of parent compound and the higher the amounts of JAU6476-desthio and JAU646-S-methyl. After storage at room temperature for one hour, only 58.9% of the radioactivity could be detected in the extract. Non-extractable residues were between 40-50% in all samples. Similar effects were observed in the two aerobic soil biotransformation studies submitted for prothioconazole (Gilges, 2000; Hellpointner, 2001), where approximately 30% of the applied radioactivity could not be extracted from the soils after one day.

The overall recovered amounts of 33.4, 95.1 and 98.6% for prothioconazole, JAU6476-desthio and JAU6476-S-methyl after 770 days of storage are very similar to those obtained from samples extracted on day 0. The relative differences between the recovered amounts on day 0 and after 420 days of storage ranged from -0.3 to -7.4% for the analyzed compounds. The total radioactive residues recovered from the samples treated with 1,2,4-triazole was

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above 96.6% of the applied radioactivity (AR) throughout the study (range of 96.6-106.1% of the AR). The concurrent recoveries during analysis of the samples ranged from 95.8 to 10.3% of the AR.

### V. REFERENCES:

1. Gilges, M. 2000. Aerobic Degradation of JAU6476 in Two Soils. Performing Laboratory: Bayer AG Crop Protection Business Group, Germany. Bayer CropScience, North Carolina. Unpublished. Report No. MR-549/99. January 27, 2000; Amended September 6, 2000 and December 5, 2001.
2. Hellpointner, E. 2001. Proazolthion (proposed) [JAU6476]: Degradation and Metabolism of JAU6476 in Aerobic Soils. Performing Laboratory: Bayer AG Crop Protection Business Group, Germany. Bayer CropScience, North Carolina. Unpublished. Report No. MR-104/01. July 25, 2001.
3. Lenz, M.F. 2004a. Terrestrial Field Dissipation of JAU6476 in Manitoba Soil, 1999. Performing Laboratories: A&L Great Lakes Laboratories, Inc., Indiana, Bayer Crop Science, Kansas and AgQuest, Saskatchewan. Bayer CropScience, North Carolina. Unpublished. Report No. 200096. March 17, 2004.
4. Lenz, M.F. 2004b. Terrestrial Field Dissipation Study, Saskatchewan, 1999. Performing Laboratories: A&L Great Lakes Laboratories, Inc., Indiana, Bayer Crop Science, Kansas and AgQuest, Saskatchewan. Bayer CropScience, North Carolina. Unpublished. Report No. 200134. March 17, 2004.
5. Shadrick, B.A., Bloomberg, A.M., and K.K. Helfrich. 1999. Freezer Storage Stability of 1H-1,2,4-Triazole[3,5-<sup>14</sup>C] in Soil. Bayer Corporation, Kansas. Unpublished. Report No. 108303. December 22, 1999.
6. Sommer, H. 2002. Determination of the Storage Stability of JAU6476 and of the Metabolites JAU6476-desthio and JAU6476-S-methyl in Soil. Bayer AG, Germany. Unpublished. Report No. MR-081/02. September 12, 2002.
7. 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.
8. 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.
9. 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.

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**Attachment 1**

**Structures of Parent and Transformation Products**

# Data Evaluation Report on the terrestrial field dissipation of prothioconazole

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EPA MRID Number 46246519

## Prothioconazole [JAU6476]

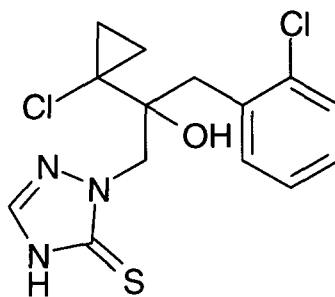
**IUPAC name:** (RS)-2-[2-(1-Chlorocyclopropyl)-3-(2-chlorophenyl)-2-hydroxypropyl]-2,4-dihydro-3H-1,2,4-triazole-3-thione.

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

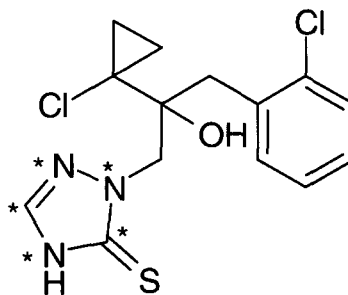
**CAS No:** 178928-70-6.

**SMILES string:** ClC1(C(Cc2ccccc2Cl))(CN2N=CNC2=S)O)CC1.

### Unlabeled



### [Triazole-1,2,4-<sup>15</sup>N,3,5-<sup>13</sup>C]JAU6476



\*Position of radiolabel.

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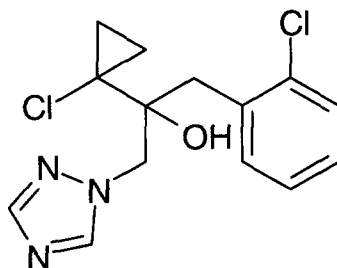
## JAU6476-desthio [SXX0665]

**IUPAC name:** Not reported.

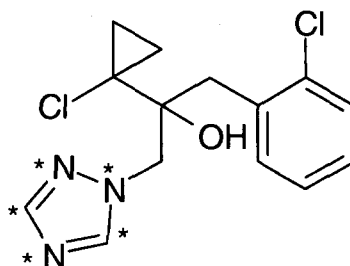
**CAS name:** 2-[2-(1-Chlorocyclopropyl)-3-(2-chlorophenyl)-2-hydroxypropyl]-1,2-dihydro-3H-1,2,4-triazole.

**CAS No.:** Not reported.

### Unlabeled



### [1,2,4-<sup>15</sup>N<sub>3</sub>,3,5-<sup>13</sup>C<sub>2</sub>]JAU6476-desthio



\*Position of radiolabel.

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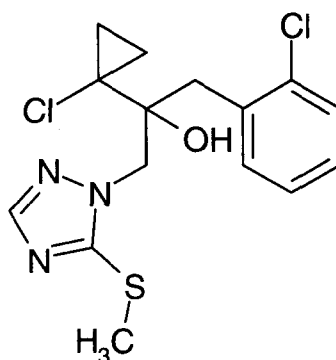
## JAU6476-S-methyl or S-methyl-JAU6476 [KTS9473; WAK7681]

**IUPAC name:** Not reported.

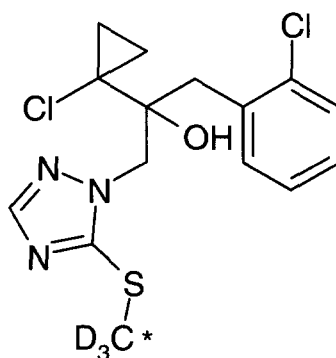
**CAS name:** alpha-1(1-Chlorocyclopropyl)-alpha-[(2-chlorophenyl)methyl]-3-(methylthio)-1H-1,2,4-triazole-1-ethanol.

**CAS No.:** Not reported.

### Unlabeled



### [Methyl-d<sub>3</sub>-<sup>13</sup>C]JAU6476-S-methyl or [Methyl-d<sub>3</sub>-<sup>13</sup>C]S-methyl-JAU6476



\*Position of radiolabel; D = deuterium; <sup>2</sup>H.

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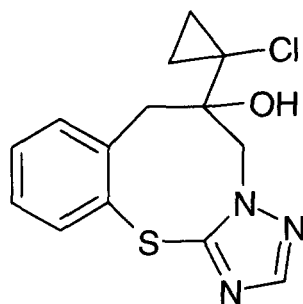
## JAU6476-thiazocine

**IUPAC name:** Not reported.

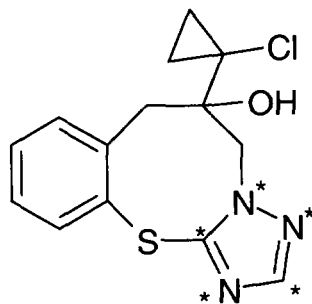
**CAS name:** 6-(1-Chlorocyclopropyl)-6,7-dihydro-triazole-5H-[1,2,4]triazolo[5,1-b][1,3]benzothiazon-6-ol.

**CAS No.:** Not reported.

### Unlabeled



### [Thiazocine-<sup>15</sup>N<sub>3</sub>-<sup>13</sup>C<sub>2</sub>]JAU6476-thiazocine



\*Position of radiolabel.

**Data Evaluation Report on the terrestrial field dissipation of prothioconazole**

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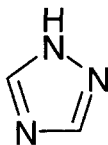
**1,2,4-triazole or 1-H-1,2,4-triazole**

**IUPAC name:** Not reported.

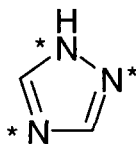
**CAS name:** 1-H-1,2,4-triazole.

**CAS No.:** Not reported.

**Unlabeled**



**[1,2,4-<sup>15</sup>N<sub>3</sub>]1,2,4-triazole or [1,2,4-<sup>15</sup>N<sub>3</sub>]1-H-1,2,4-triazole**



\*Position of radiolabel.



Chemical Name Prothioconazole  
 PC Code 113961  
 MRID 46246519  
 Guideline No. 164-1

**New York field site**  
**Half-life (days) = 96.3 \* 0- to 15-cm soil depth**

Days	Prothioconazole (ppb)	Ln (Prothioconazole)
-70	58.4	4.07
-70	62.3	4.13
-70	72.4	4.28
-56	68.7	4.23
-56	68.7	4.23
-56	66.0	4.19
-42	81.0	4.39
-42	88.7	4.49
-42	78.6	4.36
-28	65.2	4.18
-28	74.6	4.31
-28	77.7	4.35
-13	60.5	4.10
-13	58.4	4.07
-13	81.7	4.40
0	57.6	4.05
0	76.3	4.33
0	78.2	4.36
3	13.0	2.56
3	14.4	2.67
3	13.5	2.60
7	12.1	2.49
7	11.2	2.42
7	11.2	2.42
14	8.8	2.17
14	10.6	2.36
14	8.7	2.16
28	9.0	2.20
28	6.2	1.82
28	8.5	2.14
58	5.5	1.70
58	3.3	1.19
58	6.5	1.87
162	4.2	1.44
162	<MDL	---
162	7.1	1.96
211	5.1	1.63
211	3.1	1.13
211	4.4	1.48
301	<MDL	---
301	<MDL	---
301	<MDL	---
422	<MDL	---
422	<MDL	---
422	<MDL	---
567	<MDL	---
567	<MDL	---
567	<MDL	---

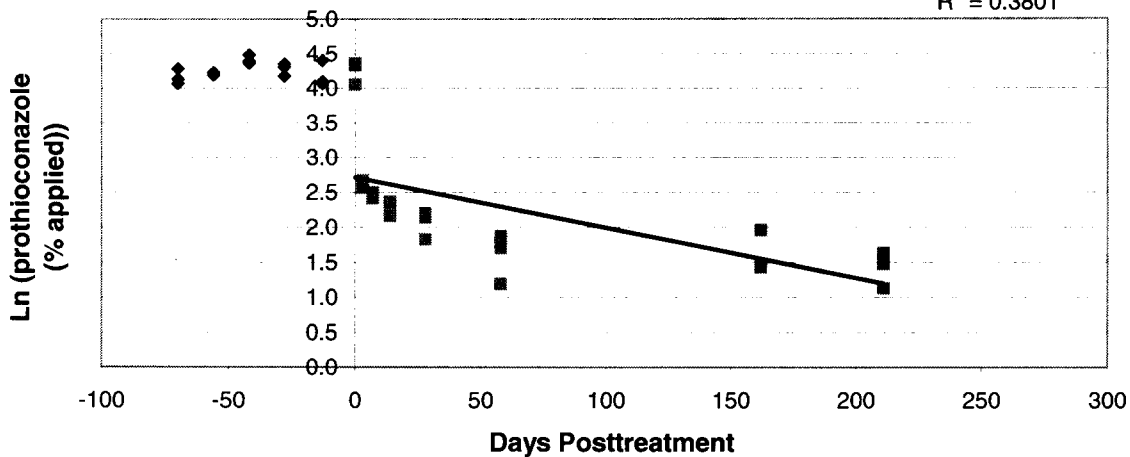
Data obtained from Table 9, pp. 36-37 of the study report.  
 LOQ= 10 ppb; MDL= 3.1 ppb.

Chemical Name Prothioconazole  
PC Code 113961  
MRID 46246519  
Guideline No. 164-1

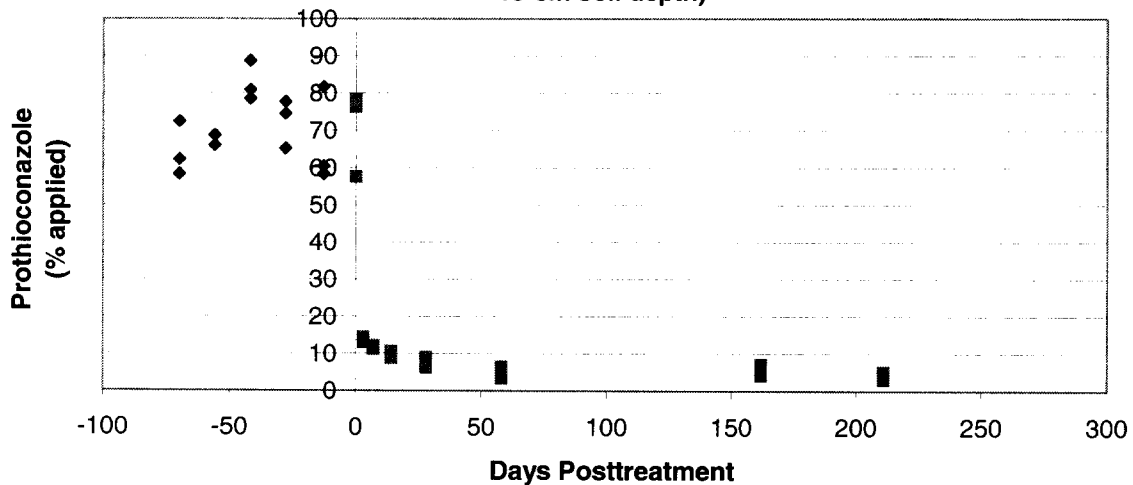
Dissipation of prothioconazole following six applications in New York (0- to 15-cm soil depth)

$$y = -0.0072x + 2.7133$$

$$R^2 = 0.3801$$



Dissipation of prothioconazole following six applications in New York (0- to 15-cm soil depth)



Chemical Name Prothioconazole  
 PC Code 113961  
 MRID 46246519  
 Guideline No. 164-1

**New York field site**

Half-life (days) = **315.1** \* 0- to 15-cm soil depth  
 (calculated from day with concentration peak, 28DAT)

Days	Prothioconazole-desthio (ppb)	Ln (Prothioconazole-desthio)
-70	19.7	2.98
-70	22.2	3.10
-70	28.5	3.35
-56	60.6	4.10
-56	58.9	4.08
-56	51.3	3.94
-42	108.5	4.69
-42	150.9	5.02
-42	106.2	4.67
-28	112.8	4.73
-28	120.1	4.79
-28	126.7	4.84
-13	116.0	4.75
-13	155.2	5.04
-13	193.6	5.27
0	183.8	5.21
0	215.6	5.37
0	194.3	5.27
3	218.1	5.38
3	216.1	5.38
3	195.7	5.28
7	236.5	5.47
7	200.7	5.30
7	219.6	5.39
14	206.6	5.33
14	224.2	5.41
14	227.3	5.43
28	221.3	5.40
28	166.7	5.12
28	273.0	5.61
58	218.2	5.39
58	N/A	---
58	223.9	5.41
162	221.9	5.40
162	202.7	5.31
162	226.6	5.42
211	188.9	5.24
211	169.3	5.13
211	183.7	5.21
301	118.4	4.77
301	121.9	4.80
301	97.9	4.58
422	103.0	4.63
422	84.0	4.43
422	68.1	4.22
567	97.2	4.58
567	74.3	4.31
567	76.0	4.33

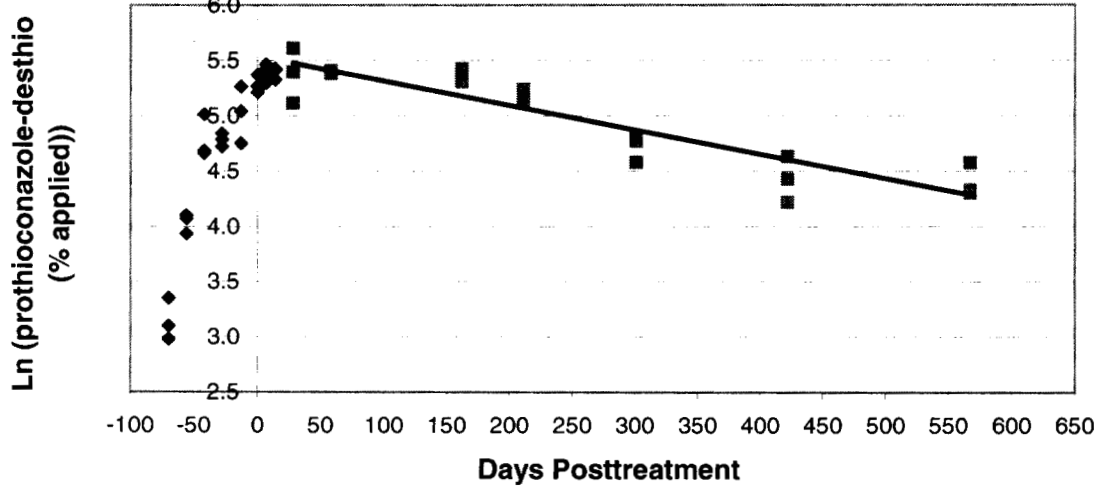
Data obtained from Table 10, pp. 38-39 of the study report.

LOQ= 10 ppb; MDL= 1.8 ppb.

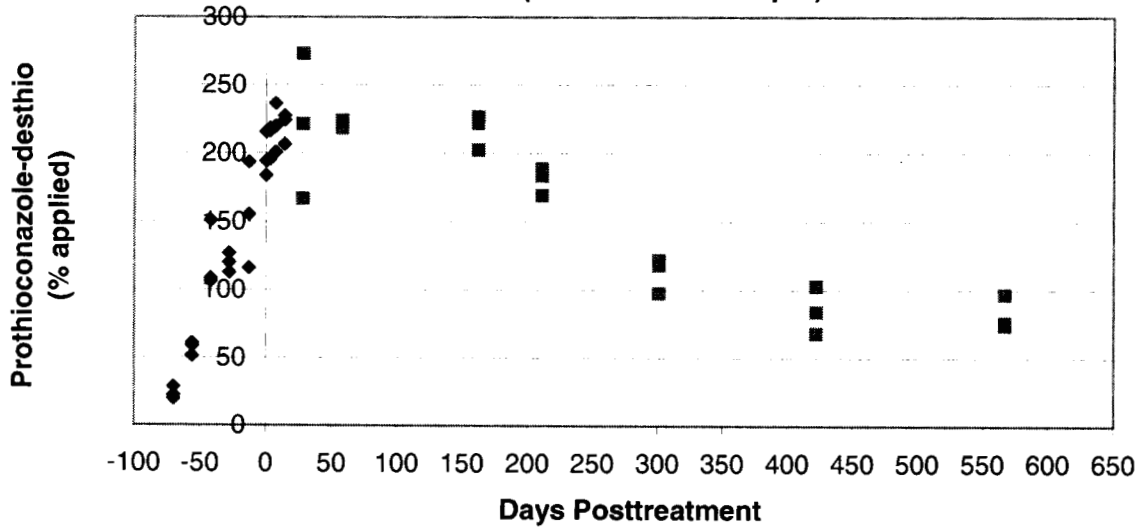
Chemical Name Prothioconazole  
PC Code 113961  
MRID 46246519  
Guideline No. 164-1

Dissipation of prothioconazole-desthio following six applications in  
New York (0- to 15-cm soil depth)

$y = -0.0022x + 5.537$   
 $R^2 = 0.8180$



Dissipation of prothioconazole-desthio following six applications in  
New York (0- to 15-cm soil depth)



Chemical Name Prothioconazole  
 PC Code 113961  
 MRID 46246519  
 Guideline No. 164-1

**New York field site**

Half-life (days) = **147.5** \* 0- to 15-cm soil depth  
 (calculated from day with concentration peak, 28DAT)

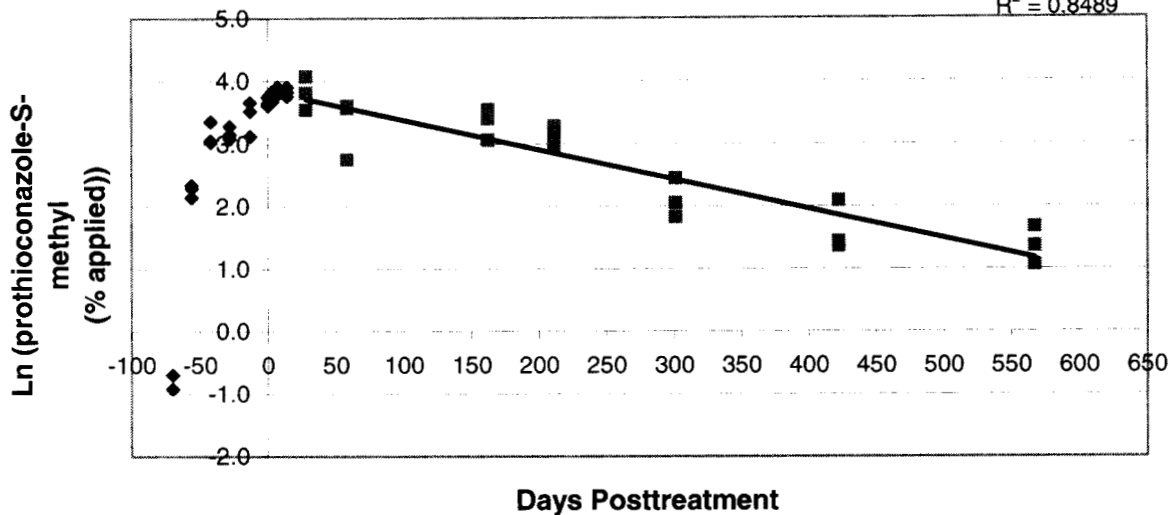
Days	Prothioconazole-S-methyl (ppb)	Ln (Prothioconazole-S-methyl)
-70	<MDL	---
-70	0.4	-0.92
-70	0.5	-0.69
-56	8.6	2.15
-56	10.4	2.34
-56	9.9	2.29
-42	21.3	3.06
-42	28.9	3.36
-42	20.9	3.04
-28	22.0	3.09
-28	23.4	3.15
-28	26.8	3.29
-13	22.9	3.13
-13	33.9	3.52
-13	39.1	3.67
0	37.0	3.61
0	42.6	3.75
0	38.5	3.65
3	40.6	3.70
3	46.4	3.84
3	39.5	3.68
7	49.8	3.91
7	44.5	3.80
7	46.4	3.84
14	43.1	3.76
14	46.2	3.83
14	50.0	3.91
28	45.5	3.82
28	34.6	3.54
28	58.9	4.08
58	35.8	3.58
58	15.7	2.75
58	36.9	3.61
162	30.1	3.40
162	21.4	3.06
162	34.6	3.54
211	22.9	3.13
211	19.1	2.95
211	26.6	3.28
301	7.8	2.05
301	11.6	2.45
301	6.2	1.82
422	8.1	2.09
422	4.2	1.44
422	3.9	1.36
567	5.3	1.67
567	2.9	1.06
567	3.9	1.36

Data obtained from Table 11, pp. 40-41 of the study report.  
 LOQ= 10 ppb; MDL= 0.4 ppb.

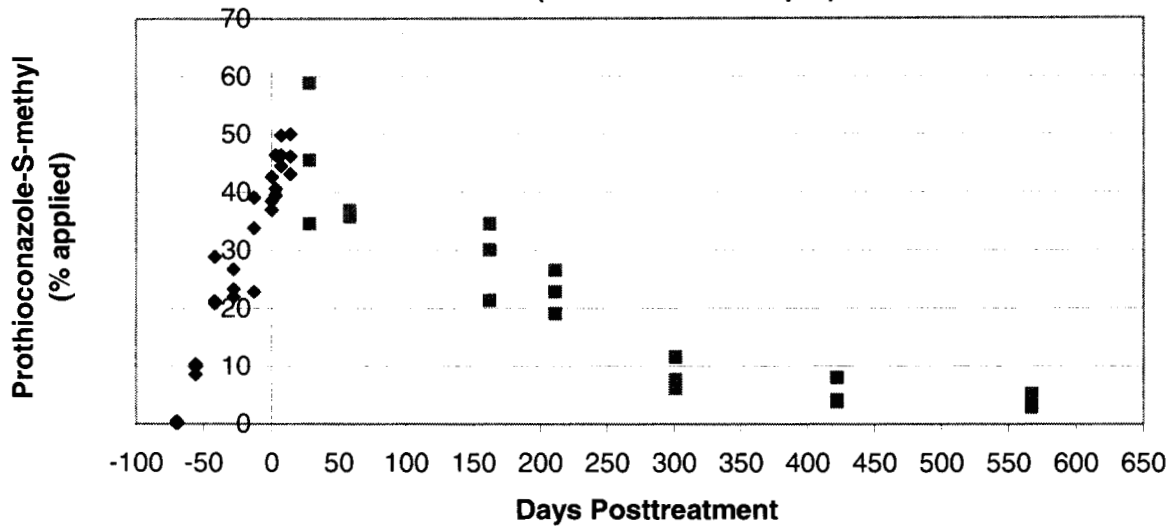
Chemical Name Prothioconazole  
PC Code 113961  
MRID 46246519  
Guideline No. 164-1

Dissipation of prothioconazole-S-methyl following six applications in  
New York (0- to 15-cm soil depth)

$y = -0.0047x + 3.847$   
 $R^2 = 0.8489$



Dissipation of prothioconazole-S-methyl following six applications in  
New York (0- to 15-cm soil depth)



Chemical Name Prothioconazole  
 PC Code 113961  
 MRID 46246519  
 Guideline No. 164-1

**Prothioconazole application verification, as % of label rate (4.36 oz. a.i./A).**

<b>Application 1</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>AVR</b>
pads	71.8	122.4	52.1	95.5	105.4	89.4
pans	133.3	74.1	115.1	120.8	68.6	102.4
<b>Application 2</b>						
pads	79.8	89.6	108.9	99.2	93.6	94.2
pans	83.5	115.5	75.7	82.6	71.8	85.8
<b>Application 3</b>						
pads	101.2	96.6	91.3	92.9	97.5	95.9
pans	86.0	87.9	83.7	85.3	88.8	86.3
<b>Application 4</b>						
pads	81.0	89.2	92.2	86.7	84.5	86.7
pans	87.8	80.9	84.3	92.5	96.1	88.3
<b>Application 5</b>						
pads	106.9	103.7	94.3	94.6	85.1	96.9
pans	82.9	96.9	85.9	94.2	81.1	88.2
<b>Application 6</b>						
pads	96.4	98.5	87.8	94.2	85.6	92.5
pans	90.5	86.8	88.0	87.4	82.2	87.0

Data obtained from Table 7, pp. 34 of the study report.

**Prothioconazole application verification, as % of applied rate (4.8 oz. a.i./A).**

<b>Application 1</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>AVR</b>
pads	65.2	111.2	47.3	86.7	95.7	81.2
pans	121.1	67.3	104.5	109.7	62.3	93.0
<b>Application 2</b>						
pads	72.5	81.4	98.9	90.1	85.0	85.6
pans	75.8	104.9	68.8	75.0	65.2	78.0
<b>Application 3</b>						
pads	91.9	87.7	82.9	84.4	88.6	87.1
pans	78.1	79.8	76.0	77.5	80.7	78.4
<b>Application 4</b>						
pads	73.6	81.0	83.7	78.8	76.8	78.8
pans	79.8	73.5	76.6	84.0	87.3	80.2
<b>Application 5</b>						
pads	97.1	94.2	85.7	85.9	77.3	88.0
pans	75.3	88.0	78.0	85.6	73.7	80.1
<b>Application 6</b>						
pads	87.6	89.5	79.8	85.6	77.8	84.0
pans	82.2	78.8	79.9	79.4	74.7	79.0

Calculated from data obtained from Table 7, pp. 34 of the study report.

Chemical Name Prothioconazole  
 PC Code 113961  
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**Difference between pad and pan prothioconazole application verification,  
 as % of label rate (4.36 oz. a.i./A).**

Application 1	A	B	C	D	E	AVR
Δ	61.5	-48.3	63.0	25.3	-36.8	12.9
Application 2						
Δ	3.7	25.9	-33.2	-16.6	-21.8	-8.4
Application 3						
Δ	-15.2	-8.7	-7.6	-7.6	-8.7	-9.6
Application 4						
Δ	6.8	-8.3	-7.9	5.8	11.6	1.6
Application 5						
Δ	-24.0	-6.8	-8.4	-0.4	-4.0	-8.7
Application 6						
Δ	-5.9	-11.7	0.2	-6.8	-3.4	-5.5

Calculated from data obtained from Table 7, pp. 34 of the study report.

**Difference between pad and pan prothioconazole application verification,  
 as % of applied rate (4.8 oz. a.i./A).**

Application 1	A	B	C	D	E	AVR
Δ	55.9	-43.9	57.2	23.0	-33.4	11.8
Application 2						
Δ	3.4	23.5	-30.2	-15.1	-19.8	-7.6
Application 3						
Δ	-13.8	-7.9	-6.9	-6.9	-7.9	-8.7
Application 4						
Δ	6.2	-7.5	-7.2	5.3	10.5	1.5
Application 5						
Δ	-21.8	-6.2	-7.6	-0.4	-3.6	-7.9
Application 6						
Δ	-5.4	-10.6	0.2	-6.2	-3.1	-5.0

Calculated from data obtained from Table 7, pp. 34 of the study report.



Chemical Name Prothioconazole  
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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)
-70	1	167.4	58.4	19.7	<MDL	<MDL	<MDL
-70	1	167.4	62.3	22.2	0.4	<MDL	<MDL
-70	1	167.4	72.4	28.5	0.5	<MDL	<MDL
<b>-70 AVR</b>	<b>1</b>	<b>167.4</b>	<b>64.4</b>	<b>23.5</b>	<b>0.4</b>	<b>&lt;MDL</b>	<b>&lt;MDL</b>
-56	2	334.7	68.7	60.6	8.6	<MDL	<MDL
-56	2	334.7	68.7	58.9	10.4	<MDL	<MDL
-56	2	334.7	66.0	51.3	9.9	<MDL	<MDL
<b>-56 AVR</b>	<b>2</b>	<b>334.7</b>	<b>67.8</b>	<b>56.9</b>	<b>9.6</b>	<b>&lt;MDL</b>	<b>&lt;MDL</b>
-42	3	502.1	81.0	108.5	21.3	<MDL	<MDL
-42	3	502.1	88.7	150.9	28.9	<MDL	<MDL
-42	3	502.1	78.6	106.2	20.9	<MDL	<MDL
<b>-42 AVR</b>	<b>3</b>	<b>502.1</b>	<b>82.8</b>	<b>121.9</b>	<b>23.7</b>	<b>&lt;MDL</b>	<b>&lt;MDL</b>
-28	4	669.5	65.2	112.8	22.0	<MDL	<MDL
-28	4	669.5	74.6	120.1	23.4	<MDL	<MDL
-28	4	669.5	77.7	126.7	26.8	<MDL	<MDL
<b>-28 AVR</b>	<b>4</b>	<b>669.5</b>	<b>72.5</b>	<b>119.9</b>	<b>24.1</b>	<b>&lt;MDL</b>	<b>&lt;MDL</b>
-13	5	836.9	60.5	116.0	22.9	<MDL	<MDL
-13	5	836.9	58.4	155.2	33.9	<MDL	<MDL
-13	5	836.9	81.7	193.6	39.1	<MDL	3.0
<b>-13 AVR</b>	<b>5</b>	<b>836.9</b>	<b>66.9</b>	<b>154.9</b>	<b>32.0</b>	<b>&lt;MDL</b>	<b>3.0</b>
0	6	1004.2	57.6	183.8	37.0	<MDL	<MDL
0	6	1004.2	76.3	215.6	42.6	<MDL	<MDL
0	6	1004.2	78.2	194.3	38.5	<MDL	<MDL
<b>0 AVR</b>	<b>6</b>	<b>1004.2</b>	<b>70.7</b>	<b>197.9</b>	<b>39.4</b>	<b>&lt;MDL</b>	<b>&lt;MDL</b>
3	n/a	1004.2	13.0	218.1	40.6	<MDL	<MDL
3	n/a	1004.2	14.4	216.1	46.4	<MDL	<MDL
3	n/a	1004.2	13.5	195.7	39.5	<MDL	<MDL
<b>3 AVR</b>	<b>n/a</b>	<b>1004.2</b>	<b>13.6</b>	<b>210.0</b>	<b>42.2</b>	<b>&lt;MDL</b>	<b>&lt;MDL</b>
7	n/a	1004.2	12.1	236.5	49.8	<MDL	3.1
7	n/a	1004.2	11.2	200.7	44.5	<MDL	<MDL
7	n/a	1004.2	11.2	219.6	46.4	<MDL	<MDL
<b>7 AVR</b>	<b>n/a</b>	<b>1004.2</b>	<b>11.5</b>	<b>218.9</b>	<b>46.9</b>	<b>&lt;MDL</b>	<b>3.0</b>
14	n/a	1004.2	8.8	206.6	43.1	<MDL	3.0
14	n/a	1004.2	10.6	224.2	46.2	<MDL	3.3
14	n/a	1004.2	8.7	227.3	50.0	<MDL	3.1
<b>14 AVR</b>	<b>n/a</b>	<b>1004.2</b>	<b>9.4</b>	<b>219.4</b>	<b>46.4</b>	<b>&lt;MDL</b>	<b>3.1</b>
28	n/a	1004.2	9.0	221.3	45.5	<MDL	<MDL
28	n/a	1004.2	6.2	166.7	34.6	<MDL	<MDL
28	n/a	1004.2	8.5	273.0	58.9	<MDL	<MDL
<b>28 AVR</b>	<b>n/a</b>	<b>1004.2</b>	<b>7.9</b>	<b>220.3</b>	<b>46.3</b>	<b>&lt;MDL</b>	<b>&lt;MDL</b>
58	n/a	1004.2	5.5	218.2	35.8	<MDL	<MDL
58	n/a	1004.2	3.3	N/A	15.7	<MDL	<MDL
58	n/a	1004.2	6.5	223.9	36.9	<MDL	<MDL
<b>58 AVR</b>	<b>n/a</b>	<b>1004.2</b>	<b>5.1</b>	<b>221.1</b>	<b>29.5</b>	<b>&lt;MDL</b>	<b>&lt;MDL</b>
162	n/a	1004.2	4.2	221.9	30.1	<MDL	<MDL
162	n/a	1004.2	<MDL	202.7	21.4	<MDL	<MDL
162	n/a	1004.2	7.1	226.6	34.6	<MDL	<MDL
<b>162 AVR</b>	<b>n/a</b>	<b>1004.2</b>	<b>4.8</b>	<b>217.1</b>	<b>28.7</b>	<b>&lt;MDL</b>	<b>&lt;MDL</b>
211	n/a	1004.2	5.1	188.9	22.9	<MDL	<MDL
211	n/a	1004.2	3.1	169.3	19.1	<MDL	<MDL
211	n/a	1004.2	4.4	183.7	26.6	<MDL	<MDL
<b>211 AVR</b>	<b>n/a</b>	<b>1004.2</b>	<b>4.2</b>	<b>180.6</b>	<b>22.9</b>	<b>&lt;MDL</b>	<b>&lt;MDL</b>
301	n/a	1004.2	<MDL	118.4	7.8	<MDL	<MDL
301	n/a	1004.2	<MDL	121.9	11.6	<MDL	3.2
301	n/a	1004.2	<MDL	97.9	6.2	<MDL	<MDL
<b>301 AVR</b>	<b>n/a</b>	<b>1004.2</b>	<b>&lt;MDL</b>	<b>112.7</b>	<b>8.5</b>	<b>&lt;MDL</b>	<b>3.1</b>
422	n/a	1004.2	<MDL	103.0	8.1	<MDL	3.3
422	n/a	1004.2	<MDL	84.0	4.2	<MDL	3.2
422	n/a	1004.2	<MDL	68.1	3.9	<MDL	3.5
<b>422 AVR</b>	<b>n/a</b>	<b>1004.2</b>	<b>&lt;MDL</b>	<b>85.0</b>	<b>5.4</b>	<b>&lt;MDL</b>	<b>3.3</b>
567	n/a	1004.2	<MDL	97.2	5.3	<MDL	3.2
567	n/a	1004.2	<MDL	74.3	2.9	<MDL	<MDL
567	n/a	1004.2	<MDL	76.0	3.9	<MDL	<MDL
<b>567 AVR</b>	<b>n/a</b>	<b>1004.2</b>	<b>&lt;MDL</b>	<b>82.5</b>	<b>4.0</b>	<b>&lt;MDL</b>	<b>3.1</b>

Data obtained from Tables 9-13, pp. 36-45, and calculated from data obtained from p. 25 of the study report.  
 LOQ= 10 ppb; MDL= 3.1, 1.8, 0.4, 1.4, and 3.0 ppb for prothioconazole, -desthio, -S-methyl, -thiazocine, and 1,2,4-triazole, respectively.

Chemical Name Prothioconazole  
 PC Code 113961  
 MRID 46246519  
 Guideline No. 164-1

**Prothioconazole and transformation products expressed as a percent of theoretically applied (4.8 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 (%)
-70	1	167.4	34.9	13.0	<MDL	<MDL	<MDL	47.9
-70	1	167.4	37.2	14.6	0.2	<MDL	<MDL	52.1
-70	1	167.4	43.3	18.8	0.3	<MDL	<MDL	62.3
<b>-70 AVR</b>	<b>1</b>	<b>167.4</b>	<b>38.5</b>	<b>15.5</b>	<b>0.2</b>	<b>&lt;MDL</b>	<b>&lt;MDL</b>	<b>54.1</b>
-56	2	334.7	20.5	20.0	2.5	<MDL	<MDL	43.0
-56	2	334.7	20.5	19.4	3.0	<MDL	<MDL	42.9
-56	2	334.7	19.7	16.9	2.8	<MDL	<MDL	39.5
<b>-56 AVR</b>	<b>2</b>	<b>334.7</b>	<b>20.3</b>	<b>18.8</b>	<b>2.8</b>	<b>&lt;MDL</b>	<b>&lt;MDL</b>	<b>41.8</b>
-42	3	502.1	16.1	23.8	4.1	<MDL	<MDL	44.0
-42	3	502.1	17.7	33.1	5.5	<MDL	<MDL	56.3
-42	3	502.1	15.7	23.3	4.0	<MDL	<MDL	43.0
<b>-42 AVR</b>	<b>3</b>	<b>502.1</b>	<b>16.5</b>	<b>26.8</b>	<b>4.5</b>	<b>&lt;MDL</b>	<b>&lt;MDL</b>	<b>47.8</b>
-28	4	669.5	9.7	18.6	3.2	<MDL	<MDL	31.5
-28	4	669.5	11.1	19.8	3.4	<MDL	<MDL	34.3
-28	4	669.5	11.6	20.9	3.8	<MDL	<MDL	36.3
<b>-28 AVR</b>	<b>4</b>	<b>669.5</b>	<b>10.8</b>	<b>19.7</b>	<b>3.5</b>	<b>&lt;MDL</b>	<b>&lt;MDL</b>	<b>34.0</b>
-13	5	836.9	7.2	15.3	2.6	<MDL	<MDL	25.1
-13	5	836.9	7.0	20.5	3.9	<MDL	<MDL	31.3
-13	5	836.9	9.8	25.5	4.5	<MDL	1.8	41.5
<b>-13 AVR</b>	<b>5</b>	<b>836.9</b>	<b>8.0</b>	<b>20.4</b>	<b>3.7</b>	<b>&lt;MDL</b>	<b>1.8</b>	<b>32.7</b>
0	6	1004.2	5.7	20.2	3.5	<MDL	<MDL	29.5
0	6	1004.2	7.6	23.7	4.1	<MDL	<MDL	35.3
0	6	1004.2	7.8	21.3	3.7	<MDL	<MDL	32.8
<b>0 AVR</b>	<b>6</b>	<b>1004.2</b>	<b>7.0</b>	<b>21.7</b>	<b>3.8</b>	<b>&lt;MDL</b>	<b>&lt;MDL</b>	<b>32.5</b>
3	n/a	1004.2	1.3	23.9	3.9	<MDL	<MDL	29.1
3	n/a	1004.2	1.4	23.7	4.4	<MDL	<MDL	29.6
3	n/a	1004.2	1.3	21.5	3.8	<MDL	<MDL	26.6
<b>3 AVR</b>	<b>n/a</b>	<b>1004.2</b>	<b>1.4</b>	<b>23.1</b>	<b>4.0</b>	<b>&lt;MDL</b>	<b>&lt;MDL</b>	<b>28.4</b>
7	n/a	1004.2	1.2	26.0	4.8	<MDL	1.5	33.5
7	n/a	1004.2	1.1	22.0	4.3	<MDL	<MDL	27.4
7	n/a	1004.2	1.1	24.1	4.4	<MDL	<MDL	29.7
<b>7 AVR</b>	<b>n/a</b>	<b>1004.2</b>	<b>1.1</b>	<b>24.0</b>	<b>4.5</b>	<b>&lt;MDL</b>	<b>1.5</b>	<b>30.2</b>
14	n/a	1004.2	0.9	22.7	4.1	<MDL	1.5	29.2
14	n/a	1004.2	1.1	24.6	4.4	<MDL	1.6	31.7
14	n/a	1004.2	0.9	25.0	4.8	<MDL	1.5	32.1
<b>14 AVR</b>	<b>n/a</b>	<b>1004.2</b>	<b>0.9</b>	<b>24.1</b>	<b>4.4</b>	<b>&lt;MDL</b>	<b>1.6</b>	<b>31.0</b>
28	n/a	1004.2	0.9	24.3	4.4	<MDL	<MDL	29.5
28	n/a	1004.2	0.6	18.3	3.3	<MDL	<MDL	22.2
28	n/a	1004.2	0.8	30.0	5.6	<MDL	<MDL	36.5
<b>28 AVR</b>	<b>n/a</b>	<b>1004.2</b>	<b>0.8</b>	<b>24.2</b>	<b>4.4</b>	<b>&lt;MDL</b>	<b>&lt;MDL</b>	<b>29.4</b>
58	n/a	1004.2	0.5	24.0	3.4	<MDL	<MDL	27.9
58	n/a	1004.2	0.3	N/A	1.5	<MDL	<MDL	1.8
58	n/a	1004.2	0.6	24.6	3.5	<MDL	<MDL	28.8
<b>58 AVR</b>	<b>n/a</b>	<b>1004.2</b>	<b>0.5</b>	<b>24.3</b>	<b>2.8</b>	<b>&lt;MDL</b>	<b>&lt;MDL</b>	<b>19.5</b>
162	n/a	1004.2	0.4	24.4	2.9	<MDL	<MDL	27.7
162	n/a	1004.2	<MDL	22.3	2.0	<MDL	<MDL	24.3
162	n/a	1004.2	0.7	24.9	3.3	<MDL	<MDL	28.9
<b>162 AVR</b>	<b>n/a</b>	<b>1004.2</b>	<b>0.5</b>	<b>23.8</b>	<b>2.7</b>	<b>&lt;MDL</b>	<b>&lt;MDL</b>	<b>27.0</b>
211	n/a	1004.2	0.5	20.7	2.2	<MDL	<MDL	23.4
211	n/a	1004.2	0.3	18.6	1.8	<MDL	<MDL	20.7
211	n/a	1004.2	0.4	20.2	2.5	<MDL	<MDL	23.2
<b>211 AVR</b>	<b>n/a</b>	<b>1004.2</b>	<b>0.4</b>	<b>19.8</b>	<b>2.2</b>	<b>&lt;MDL</b>	<b>&lt;MDL</b>	<b>22.4</b>
301	n/a	1004.2	<MDL	13.0	0.7	<MDL	<MDL	13.7
301	n/a	1004.2	<MDL	13.4	1.1	<MDL	1.6	16.1
301	n/a	1004.2	<MDL	10.8	0.6	<MDL	<MDL	11.3
<b>301 AVR</b>	<b>n/a</b>	<b>1004.2</b>	<b>&lt;MDL</b>	<b>12.4</b>	<b>0.8</b>	<b>&lt;MDL</b>	<b>1.5</b>	<b>13.7</b>
422	n/a	1004.2	<MDL	11.3	0.8	<MDL	1.6	13.7
422	n/a	1004.2	<MDL	9.2	0.4	<MDL	1.6	11.2
422	n/a	1004.2	<MDL	7.5	0.4	<MDL	1.7	9.6
<b>422 AVR</b>	<b>n/a</b>	<b>1004.2</b>	<b>&lt;MDL</b>	<b>9.3</b>	<b>0.5</b>	<b>&lt;MDL</b>	<b>1.7</b>	<b>11.5</b>
567	n/a	1004.2	<MDL	10.7	0.5	<MDL	1.6	12.8
567	n/a	1004.2	<MDL	8.2	0.3	<MDL	<MDL	8.4
567	n/a	1004.2	<MDL	8.3	0.4	<MDL	<MDL	8.7
<b>567 AVR</b>	<b>n/a</b>	<b>1004.2</b>	<b>&lt;MDL</b>	<b>9.1</b>	<b>0.4</b>	<b>&lt;MDL</b>	<b>1.5</b>	<b>10.0</b>

Calculated from data obtained from Tables 9-13, pp. 36-45, and calculated from data obtained from p. 25 of the study report.  
 LOQ= 10 ppb; MDL= 3.1, 1.8, 0.4, 1.4, and 3.0 ppb for prothioconazole, -desthio, -S-methyl, -thiazocine, and 1,2,4-triazole, respectively.