

US EPA ARCHIVE DOCUMENT

Data Evaluation Report on the terrestrial field dissipation of BAS 510 F

PMRA Submission Number {.....}

EPA MRID Number 45405222

Data Requirement: PMRA DATA CODE:
EPA DP Barcode: D278387
OECD Data Point:
EPA Guideline: 164-1

Test material: BAS 510 .. F

End Use Product name: Not specified
Formulation type: Wettable granule

Concentration of a.i.: 69.6%

Active ingredient

Common name:

Chemical name:

IUPAC: 2-Chloro-N-(4'-chlorobiphenyl-2-yl)-nicotinamide.

CAS name: 2-Chloro-N-(4-chloro[1,1-biphenyl]-2-yl)-3-pyridinecarboxamide.

CAS No: 188425-85-6.

Synonyms: Nicobifen, ~~BAS 516-02 F~~

SMILES string:

Primary Reviewer: Dan Hunt
Dynamac Corporation

Signature: *Dan Hunt*
Date: 1/14/02

QC Reviewer: Joan Harlin
Dynamac Corporation

Signature: *Joan L. Harlin*
Date: 1/14/02

Secondary Reviewer: Cheryl Sutton
EPA

Signature: *Cheryl Sutton*
Date: 4/02

Company Code:

Active Code:

Use Site Category:

EPA PC Code: 128008

CITATION: : Jackson, S., M. Saha, and J. McDonell. 2001. 1999 Field dissipation of BAS 510..F in terrestrial use patterns for Canada. BASF Study No. 58647. BASF Reg. Doc. No. 2001/5000938. Unpublished study performed by Vaughn Agricultural Research Services, Branchton, Ontario, ICMS, Inc., Portage la Prairie, Manitoba, Three Links Ag Research, Fairview, Alberta, Adpen Laboratories, Inc., Jacksonville, FL, and BASF Corporation, Research Triangle Park, NC, and submitted by BASF Corporation, Research Triangle Park, NC. Study initiated March 4, 1999 and completed March 13, 2001.



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EXECUTIVE SUMMARY:

Soil dissipation/accumulation of BAS 510 F under Canadian field conditions was conducted in bareground plots in Ontario, Manitoba, and Alberta (ecoregions were not reported). The experiment was carried out in accordance with the Health Canada Guideline T-1-255 and in compliance with the US EPA FIFRA (40 CFR, Part 160) GLP standard. For each test plot, BAS 510 F was broadcast twice (5-7 day interval) at target rates of 0.56 kg a.i./ha in 6 x 22.5 m, 7 x 32 m, or 10 x 26 m sampling plots. The applied rate corresponds to 100% of the proposed label rate. Rainfall was supplemented with irrigation to reach the 25-50 year average rainfall. The treated plots were 7-15 m apart, and the control plots were >15 m away from the nearest treated plot at each field site.

The application rate at each test site was verified using fifteen Petri dishes containing soil that were placed in the test plots prior to both applications. The mean recoveries from the field application monitors placed in the test plots were 72-82%, 76-85% and 95-102% of the target for the Ontario, Manitoba, and Alberta test plots, respectively (mean recoveries from both applications). Field spiking of the samples was done by fortifying control soil from each test site with BAS 510 F at approximately 0.75 µg/g. The mean recoveries of BAS 510 F from the field spiked samples (across all fortification events) were 86 ± 4.0%, 79 ± 4.2%, and 81 ± 5.6% of the applied for the samples fortified at the Ontario, Manitoba, and Alberta field sites, respectively.

Soil samples were taken prior to and following both applications, at approximately 1, 2, and 3 days following the first application, and at approximately 1, 2, 3, 5, 7, 10, 14, 21, 30, 60, 90, 120, 180, 270, and 360 days following the second application to a depth of 0 - 120 cm. The soil samples were extracted twice by shaking with methanol followed by methanol:water (50:50, v:v), diluted with water with 0.3% formic acid and 4 mM ammonium formate or water:methanol (80:20, v:v) with 0.3% formic acid and 4 mM ammonium formate and analyzed for BAS 510 F and the degradates 2-chloronicotinic acid and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide (M510F49) by LC-MS/MS. The LOQ for each analyte in soil was 0.010 mg/kg.

At the Ontario site, the maximum measured concentration following the second application (day 0) was 0.409 mg a.i./kg soil (after adjusting for the concentration present 2 days prior to the second application), which is 82% of the applied rate (registrant-calculated based on the zero-time core concentration, 0.50 mg/kg). Following the second application, BAS 510 F dissipated from a maximum of 0.860 mg a.i./kg soil at day 0 (0-7.5 cm depth) to 0.429 mg a.i./kg soil by 22 days, was variable from 0.187 to 0.396 mg a.i./kg soil from 30 to 301 days, and was 0.176 mg a.i./kg soil at 369 days posttreatment (the last sampling interval). BAS 510 F was only detected in the top (0-15 cm) soil layer. The transformation products 2-chloronicotinic acid (M510F47) and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide (M510F49) were detected at maximum concentrations of 0.013 mg/kg and 0.040 mg/kg (1.3% and 4.0% of the applied amount, respectively), observed at 1 and 118 days following the second application, respectively, in the 0-7.5 cm soil layer.

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Under field conditions at the Ontario site, BAS 510 F had a DT50 value of 30.0 days and a DT75 value of 353 days. At the end of the 369 day period, the total carryover of residues of BAS 510 F was 19.8% of the total applied amount.

At the Manitoba site, the maximum measured concentration following the second application (3 days) was 0.394 mg a.i./kg soil (after adjusting for the concentration present 2 days prior to the second application), which is 79% of the applied rate (registrant-calculated based on the zero-time core concentration, 0.50 mg/kg). Following the second application, BAS 510 F dissipated from 0.446-0.608 mg a.i./kg soil at 0-3 days (0-7.5 cm depth) to 0.314-0.421 mg a.i./kg soil by 5-360 days posttreatment (the last sampling interval). BAS 510 F was only detected in the top (0-15 cm) soil layer. The transformation product 2-chloronicotinic acid was detected once each in the 0-7.5 and 7.5-15 cm soil layers at 0.015 mg/kg (1.5% of the applied amount) and 0.003 mg/kg (0.3%), respectively, both observed immediately following the first application.

Under field conditions at the Manitoba site, BAS 510 F had a DT50 value of 316 days and a DT75 value of >360 days. At the end of the 360 day period, the total carryover of residues of BAS 510 F was 31.4% of the total applied amount.

At the Alberta site, the maximum measured concentration following the second application (6 days) was 0.495 mg a.i./kg soil (after adjusting for the concentration present 2 days prior to the second application), which is 99% of the applied rate (reviewer-calculated based on the registrant-calculated zero-time core concentration, 0.50 mg/kg). Following the second application, BAS 510 F dissipated from a maximum of 0.807 mg a.i./kg soil at 6 days (0-7.5 cm depth) to 0.653-0.775 mg a.i./kg soil by 7-79 days, and was 0.397-0.488 mg a.i./kg soil at 303-358 days posttreatment (the last sampling interval). BAS 510 F was only detected in the top (0-7.5 cm) soil layer. The transformation products 2-chloronicotinic acid and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide (M510F49) were detected at maximum concentrations of 0.019 mg/kg and 0.014 mg/kg (1.9% and 1.4% of the applied amount, respectively), observed immediately following the first application and at 79 days following the second application, respectively, in the 0-7.5 cm soil layer.

Under field conditions at the Alberta site, BAS 510 F had a DT50 value of 372 days (a DT75 or DT90 value was not determined). At the end of the 358 day period, the total carryover of residues of BAS 510 F was 48.8% of the total applied amount.

The major routes of dissipation of BAS 510 F under terrestrial field conditions at Ontario, Manitoba, and Alberta could not be determined from the data provided in this report. Leaching was minimal and the major transformation products did not show a pattern of accumulation. Volatilization and runoff were not measured. Based on laboratory studies that demonstrated that the transformation of BAS 510 F resulted primarily from bound residue and CO₂ formation, it is assumed that these were also the predominant dissipation processes in the field. However, the half-lives for all three sites are of questionable value due to temporal and inter-replicate data variability at all sites and insufficient sampling intervals (i.e., no sampling between 79 and 303 days) at the Alberta site. At the Ontario site, mean concentrations of greater than 50% of the maximum were observed in at least one replicate at 62, 118 and 369 days. The data for the

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Manitoba and Alberta sites indicate that the half-lives at these sites were greater than the duration of the study.

RESULTS SYNOPSIS

Location/soil type: Cambridge, Ontario/Brant soil series

DT50: 30.0 days (of questionable worth due to data variability)

DT75: 353 days

Major transformation products detected: 2-chloronicotinic acid (M510F47) and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide (M510F49)

Dissipation routes: Could not be determined

Location/soil type: Portage la Prairie, Manitoba/Dugas clay and Neuhorst clay loam soil series

DT50: 316 days (of questionable value due to data variability)

DT75: >360 days

Major transformation products detected: 2-chloronicotinic acid (M510F47)

Dissipation routes: Could not be determined

Location/soil type: Fairview, Alberta/Peoria-Gage-Landry soil association

DT50: 372 days (of questionable worth due to insufficient data points and data variability)

DT75 or DT90: Not determined

Major transformation products detected: 2-chloronicotinic acid (M510F47) and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide (M510F49)

Dissipation routes: Could not be determined

Study Acceptability: This study is classified as supplemental. It cannot be used to satisfy the guideline data requirement for a terrestrial field dissipation study. The study was not conducted domestically, and the half-lives for all three sites are of questionable value due to temporal and inter-replicate data variability at all sites and insufficient sampling intervals (i.e., no sampling between 79 and 303 days) at the Alberta site.

I. MATERIALS AND METHODS

GUIDELINE FOLLOWED: The study was conducted according to the Health Canada Guideline T-1-255. The study did not deviate from EPA Subdivision N 164-1.

COMPLIANCE: The study was conducted in compliance with U.S. EPA FIFRA (40 CFR Part 160) Good Laboratory Practice standards. Signed and dated GLP Compliance and No Data Confidentiality statements were provided.

A. MATERIALS:

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1. Test Material BAS 510 F

**Chemical Structure
of the active ingredient(s):**

Description: Wettable granule

**Storage conditions of
test chemicals:** Storage conditions ranged from 2.0 to 34.2°C from receipt of
the test substance until last use (all sites).

Physico-chemical properties of the active ingredient(s): BAS 510 F

Parameter	Values	Comments
Water solubility	4.63 mg/L	Temperature not reported
Vapour pressure/volatility		
UV absorption		
pKa		
$K_{ow}/\log K_{ow}$		
Stability of Compound at room temperature		

Data obtained from MRID 45405220.

2. Test site: The test sites were located in Ontario, Manitoba, and Alberta (pp. 11-12). The Ontario test site was located near Cambridge, and represents the central Canadian growing region. The Manitoba test site was located near Portage la Prairie, and is representative of the eastern prairie region which is also a large field/row crop production area. The Alberta test site was located near Fairview, and represents the northwestern-most prairie province growing region. The Ontario test plot had previously been treated with Pursuit, Banvel, and Dual in the past three years, the Manitoba test plot had previously been treated with propanil plus MCPA, propanil, and diclofop-methyl plus bromoxynil in the past three years, and the Alberta test plot had previously been treated with Roundup, BAS 635 00H, Edge, and Lontrel in the past three years (Appendix B, Tables IX-XI, pp. 79, 88, 97).

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

Details		Ontario	Manitoba	Alberta
Geographic coordinates	Latitude	Not available	Not available	Not available
	Longitude	Not available	Not available	Not available
	Province/State	Ontario	Manitoba	Alberta
	Country	Canada	Canada	Canada
	Ecoregion	Not available	Not available	Not available
Slope Gradient		<1%	<1%	1%
Depth to ground water (m)		3 m	2-3 m	9.1 m
Distance from weather station used for climatic measurements		On-site	5 km for precipitation and 67 miles for all other weather data	On-site
Indicate whether the meteorological conditions before starting or during the study were within 30 year normal levels (Yes/No). If no, provide details.		Precipitation plus irrigation equalled 121% of the historical average.	Precipitation plus irrigation equalled 133% of the historical average.	Precipitation plus irrigation equalled 113% of the historical average.
Other details, if any				

Data obtained from Tables VIII-X, pp. 45-47, and Appendix B, pp. 77-79, 88, 97, in the study report.

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

Use	Year	Ontario	Manitoba	Alberta
Crops grown	Previous year	Winter wheat	Barley	Fallow
	2 years previous	Soybeans	Cereals	Fallow
	3 years previous	Corn	Spring rye	Canola
Pesticides used	Previous year	None	Propanil plus MCPA	Roundup
	2 years previous	Pursuit	Propanil	Roundup and BAS 635 00H
	3 years previous	Banvel and Dual	Diclofop-methyl plus bromoxynil	Edge and Lontrel
Fertilizers used	Previous year	Not available	Not available	Not available
	2 years previous	Not available	Not available	Not available
	3 years previous	Not available	Not available	Not available
Cultivation methods, if provided (eg. Tillage)	Previous year	Not available	Not available	Not available
	2 years previous	Not available	Not available	Not available

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Use	Year	Ontario	Manitoba	Alberta
	3 years previous	Not available	Not available	Not available
Other details, if any	Previous year			
	2 years previous			
	3 years previous			

Data obtained from Appendix B, Tables IX-XI, pp. 79, 88, 97, in the study report.

3. Soils:

Table 3: Properties of the soil from Ontario.

Property	Depth (cm)							
	0-15	15-30	30-45	45-60	60-75	75-90	90-105	105-120
Textural classification	loam		clay loam	clay		clay loam		
% sand	34	30	28	22	26	28	26	28
% silt	42	44	34	36	28	32	34	40
% clay	24	26	38	42	46	40	40	32
pH (1:1 soil:water or other)	6.2	6.6	7.3	7.8	8.1	8.2	8.3	8.3
Total organic carbon (%)								
Total organic matter (%)	2.8	1.9	0.7	0.5	0.5	0.5	0.4	0.2
CEC (meq/100 g)	12.2	13.7	15.2	16.8	16.8	15.4	15.9	13.3
Bulk density (g/cm ³)	1.15-1.39	1.39-1.57	1.32-1.47	1.37-1.46	1.19-1.52	1.34-1.50	1.37-1.52	1.34-1.50
Moisture at 1/3 atm (%)	24.1	24.1	25.0	25.8	27.2	26.2	26.3	23.3
Taxonomic classification (e.g., ferro-humic podzol)	Brunisolic Grey Brown Luvisol							
Soil mapping unit	Not provided (Brant soil series)							
Others								

Data obtained from pp. 11-12, and Table VIII, p. 45 in the study report.

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Table 4: Properties of the soil from Manitoba.

Property	Depth (cm)							
	0-15	15-30	30-45	45-60	60-75	75-90	90-105	105-120
Textural classification	silt loam	loam	clay loam			loam	silt loam	loam
% sand	23	27	25	29	29	31	27	29
% silt	54	50	44	40	42	46	52	50
% clay	23	23	31	31	29	23	21	21
pH (1:1 soil:water or other)	7.8	8.4	8.6	8.7	8.6	8.4	8.5	8.3
Total organic carbon (%)								
Total organic matter (%)	7.0	4.3	2.3	1.3	0.9	0.6	0.5	0.5
CEC (meq/100 g)	37.5	31.2	26.3	22.8	20.1	16.7	15.8	17.0
Bulk density (g/cm ³)	1.04-1.14	0.99-1.05	1.00-1.16	1.16-1.24	1.18-1.34	1.20-1.43	1.11-1.95	1.29-1.43
Moisture at 1/3 atm (%)	39.8	38.0	34.5	28.4	28.2	25.3	26.2	27.8
Taxonomic classification (e.g., ferro-humic podzol)	Gleyed Rego Black (Dugas) and Gleyed Carbonated Rego Black (Neuhorst)							
Soil mapping unit	Not provided (Dugas and Neuhorst soil series)							
Others								

Data obtained from pp. 11-12, and Table IX, p. 46 in the study report.

Table 5: Properties of the soil from Alberta.

Property	Depth (cm)							
	0-15	15-30	30-45	45-60	60-75	75-90	90-105	105-120
Textural classification	loam	clay loam		clay				
% sand	32	30	22	12	12	12	10	14
% silt	42	38	38	36	34	30	28	28
% clay	26	32	40	52	54	58	62	58
pH (1:1 soil:water or other)	5.5	6.4	7.0	7.8	8.1	8.1	8.1	8.1
Total organic carbon (%)								
Total organic matter (%)	5.4	1.6	1.2	1.5	1.5	1.6	1.6	1.5
CEC (meq/100 g)	19.6	17.5	21.4	25.2	24.3	25.7	25.8	24.9
Bulk density (g/cm ³)	1.28-1.62	1.35-1.73	1.42-1.74	1.42-1.63	1.37-1.71	1.43-1.69	1.48-1.63	1.54

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Property	Depth (cm)							
	0-15	15-30	30-45	45-60	60-75	75-90	90-105	105-120
Moisture at 1/3 atm (%)	27.9	24.2	28.7	32.9	34.6	34.9	35.1	33.8
Taxonomic classification (e.g., ferro-humic podzol)	Eluviated black (Peoria and Gage) and black solod's (Landry)							
Soil mapping unit	Not provided (Peoria-Gage-Landry soil association)							
Others								

Data obtained from pp. 11-12, and Table X, p. 47 in the study report.

B. EXPERIMENTAL DESIGN:

1. Experimental design:

Table 6: Experimental design.

Details		Ontario	Manitoba	Alberta
Duration of study		374 days (369 days following the last application)	365 days (360 days following the last application)	365 days (358 days following the last application)
Uncropped (bare) or cropped		Bareground	Bareground	Bareground
Control used (Yes/No)		Yes	Yes	Yes
No. of replications	Controls	1	3	3
	Treatments	3	3	3
Plot size (L x W m)	Control	6 x 22.5 m	3 x 24 m	10 x 10 m
	Treatment	6 x 22.5 m	7 x 32 m	10 x 26 m
Distance between control plot and treated plot		115.5 m from the nearest treated plot	15 m from the nearest treated plot	16 m from the nearest treated plot
Distance between treated plots		7 m	15 m	8-10 m
Application rate(s) used (g a.i./ha)		560 g a.i./ha	560 g a.i./ha	560 g a.i./ha
Was the maximum label rate per ha used in study? (Yes/No)		Yes	Yes	Yes
Number of applications		2	2	2
Application Date(s) (dd mm yyyy)		15/7/1999 and 20/7/1999	14/7/1999 and 19/7/1999	21/7/1999 and 28/7/1999
For multiple applications, application rate at Day 0 and at each application time (mg a.i./kg soil) (assuming 7.5 cm depth and bulk density of 1.5 g/cm ³)		0.50 mg/kg for both applications	0.50 mg/kg for both applications	0.50 mg/kg for both applications

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Details		Ontario	Manitoba	Alberta
Application method (eg., spraying, broadcast etc.)		Broadcast	Broadcast	Broadcast
Type of spray equipment, if used		Tractor-mounted flat boom sprayer with flat fan 8003 DG nozzles	Tractor-mounted flat boom sprayer with flat fan 11002 or 8002 VS nozzles	Tractor-mounted flat boom sprayer with flat fan 8001 VS nozzles
Total volume of spray solution applied/plot OR total amount broadcasted/plot		220 L/ha	220 L/ha	220 L/ha
Identification and volume of carrier (e.g., water), if used		Water	Water	Water
Name and concentration of co-solvents, adjuvants and/or surfactants, if used		None	None	None
Indicate whether the following monthly reports were submitted:				
Average minimum and maximum precipitation		Yes	Yes	Yes
Average minimum and maximum air temperature		Yes	Yes	Yes
Average minimum and maximum soil temperature		No	No	No
Average annual frost-free periods		No	No	No
Indicate whether the Pan evaporation data were submitted		No	No	No
Meteorological conditions during application	Cloud cover	90% and 5% for applications 1 and 2	0% and 90% for applications 1 and 2	15% and 100% for applications 1 and 2
	Temperature (°C)	20.6 and 15 for applications 1 and 2	20.5 and 17.0 for applications 1 and 2	8 and 14 for applications 1 and 2
	Humidity	80% and 90% for applications 1 and 2	75% and 90% for applications 1 and 2	81% and 87% for applications 1 and 2
	Sunlight (hr)	Not available	Not available	Not available
Pesticides used during study: name of product/a.i concentration: amount applied: application method:		The test plots were treated 4 times with Roundup (3-7 L/ha).	The test plots were treated 3 times with Roundup Transorb (1-2 L/ha) and once with Gramoxone PDQ (4 L/ha).	The test plots were treated 4 times with Roundup (4 L/A or 0.45 lb a.i./A).

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Details	Ontario	Manitoba	Alberta
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, via sprinkler. The test plots received a total of 71.4 mm from irrigation (all during July, August and September of 1999).	Yes, via sprinkler. The test plots received a total of 71.8 mm from irrigation (all during July and August of 1999 and June and July of 2000).	Yes, via sprinkler. The test plots received a total of 106.8 mm from irrigation (all during September of 1999 and May, June and July of 2000).
Indicate whether water received through rainfall + irrigation equals the 30 year average rainfall (Yes/No)	Yes	Yes	Yes
Were the application concentrations verified? (Briefly describe in Section 2 [*] , if used)	Yes	Yes	Yes
Were field spikes used? (Briefly describe in Section 3 [†] , if used)	Yes	Yes	Yes
Good agricultural practices followed (Yes or No)	Yes	Yes	Yes
Indicate if any abnormal climatic events occurred during the study (eg., drought, heavy rainfall, flooding, storm etc.)	None	None	None
If cropped plots are used, provide the following details: Plant - Common name/variety: Details of planting: Crop maintenance (eg., fertilizers used):	N/A	N/A	N/A
Volatilization included in the study (Yes/No) (if included, describe in Section 4 [§])	No	No	No
Leaching included in the study (Yes/No) (if included, describe in Section 5 [§])	Yes	Yes	Yes
Runoff included in the study (Yes/No) (if included, describe in Section 6 [§])	No	No	No

Data obtained from Tables VIII-X, pp. 45-47, Appendix B, pp. 65-105, in the study report.

*** 2. Application Verification:** The application rate at each test site was verified using fifteen Petri dishes (100 mm) that were placed in the test plots prior to both applications (p. 13). Each Petri dish contained approximately 10 g of sieved soil from an untreated portion of the test site. The Petri dishes were collected and composited (three dishes per composite) immediately following each application.

† 3. Field Spiking: Samples (20 g) of sieved (1 mm) control soil collected from each test site were fortified with 15 µg BAS 510 F solution on the sampling intervals targeting 0, 3, 7, 14, 30,

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60, and 360 days following the last application (p. 14; Appendix B, p. 75). The field fortified samples were analyzed at about the same time as the corresponding soil core samples (pp. 25-26). Field spiked samples were not prepared for the degradates 2-chloronicotinic acid and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide.

§ 4. **Volatilization:** Volatilization was not measured.

¶ 5. **Leaching:** Fifteen cores were taken from the treated plots prior to and following both applications, at approximately 1, 2, and 3 days following the first application, and at approximately 1, 2, 3, 5, 7, 10, 14, 21, 30, 60, 90, 120, 180, 270, and 360 days following the second application to a depth of 120 cm to determine the mobility of the test substance in the soil profile (pp. 12-13, Appendix B, Table V, p. 73). In field Time Domain Reflectometry (TDR) units were used to determine if sufficient water was applied to the test plots and to determine if compound movement correlated to recharge events (pp. 21-22).

* 6. **Runoff:** Runoff was not studied.

7. **Supplementary Study:** Two method validation studies (MRIDs 45405225 and 45405226) and two storage stability studies (MRIDs 45405223 and 45405224) were conducted and submitted.

MRID 45405225. BASF Method D0004 "The determination of residues of BAS 510 F and its metabolites 2-chloronicotinic acid and 1-(4-chlorophenyl)-2-aminobenzene in soil using LC-MS/MS" was validated using control soil from California, Indiana, New Jersey, and Alberta, and German 2.2 soil (Appendix E, pp. 85-86). Soil samples were fortified at 0.01, 0.1, and 1.0 ppm. The method was later modified (without change to the protocol) to include the degradate 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide and to remove 1-(4-chlorophenyl)-2-aminobenzene (BASF Method D0004/1), and was validated using control soil collected from Georgia, California, and Alberta, and German 2.2 soil.

MRID 45405226. BASF Method D0004/1 "The determination of residues of BAS 510 F and its metabolites 2-chloronicotinic acid and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide in soil using LC-MS/MS" was validated in an independent laboratory using a high clay content soil from Illinois (p. 8). Samples were fortified at 0.01 and 0.10 mg/kg.

MRID 45405224. A loamy sand soil from Germany was treated with diphenyl ring-labeled ¹⁴C-BAS 510 F at a concentration of 0.930 mg/kg and stored frozen (-18 to -22°C) for up to 2 years prior to analysis (pp. 11-13). Samples were collected for analysis at 0, 30, 87, 181, 365, and 730 days posttreatment.

MRID 45405223. Soil samples (0-6 and 12-18 inch depths) were treated with BAS 510 F and the degradates 2-chloronicotinic acid and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide at a concentration of 0.1 ppm (p. 9). Samples fortified with BAS 510 F and 2-chloronicotinic acid were collected for analysis at day 0 and 1, 3, and 6 months posttreatment; samples collected at day 0 and 1 month were extracted and analyzed according to BASF Method D0004 and samples collected at 3 and 6 months were extracted and analyzed according to BASF Method D0004/1.

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Samples fortified with 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide were collected for analysis at day 0 and 1 and 3 months posttreatment; all samples were extracted and analyzed according to BASF Method D0004/1.

8. Sampling:

Table 7: Soil sampling.

Details	Ontario	Manitoba	Alberta
Method of sampling (random or systematic)	Random	Random	Random
Sampling intervals	Prior to and following both applications, at 1, 2, and 3 days following the first application, and at 1, 2, 3, 5, 7, 10, 14, 22, 30, 62, 91, 118, 301, and 369 days following the second application	Prior to and following both applications, at 2 and 3 days following the first application, and at 1, 2, 3, 5, 7, 10, 14, 21, 32, 59, 92, 275, and 360 days following the second application	Prior to and following both applications, at 1, 2, and 5 days following the first application, and at 1, 3, 5, 6, 7, 10, 14, 21, 30, 58, 79, 303, and 358 days following the second application
Method of soil collection (eg., cores)	Cores	Cores	Cores
Sampling depth	120 cm	120 cm	120 cm
Number of cores collected per plot	15 (5 per replicate)	15 (5 per replicate)	15 (5 per replicate)
Number of segments per core	Nine	Nine	Nine
Length of soil segments	7.5 cm (0-15 cm depth) and 15 cm (15-120 cm depth)	7.5 cm (0-15 cm depth) and 15 cm (15-120 cm depth)	7.5 cm (0-15 cm depth) and 15 cm (15-120 cm depth)
Core diameter (Provide details if more than one width)	Minimum 4 inch diameter (0-15 cm depth samples) and unspecified diameter (15-120 cm depth samples)	Minimum 4 inch diameter (0-15 cm depth samples) and unspecified diameter (15-120 cm depth samples)	Minimum 4 inch diameter (0-15 cm depth samples) and unspecified diameter (15-120 cm depth samples)
Method of sample processing, if any	Composited by depth and replicate, and homogenized prior to analysis	Composited by depth and replicate, and homogenized prior to analysis	Composited by depth and replicate, and homogenized prior to analysis
Storage conditions	Frozen	Frozen	Frozen
Storage length (days)	561 days	561 days	561 days

Data obtained from pp. 12-13, 16, 18, and Appendix B, pp. 71-73, in the study report.

9. Analytical Procedures: Soil samples were analyzed for BAS 510 F and the degradates 2-chloronicotinic acid and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide (M510F49) using BASF Draft Analytical Method D0004/1 with modifications (p. 16; Appendix C, pp. 140-141).

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Soil samples were extracted by shaking with methanol followed by methanol:water (50:50, v:v). After the extraction step was repeated, the samples were centrifuged and the extracts were diluted with methanol. For low residue samples, an aliquot of the extract was further diluted with HPLC grade water with 0.3% formic acid and 4 mM ammonium formate and filtered prior to LC-MS/MS analysis. For higher residue samples, an aliquot of the extract was further diluted with water:methanol (80:20, v:v) with 0.3% formic acid and 4 mM ammonium formate and filtered prior to LC-MS/MS analysis. The limit of quantitation for each analyte was 0.010 mg/kg (p. 17). Mean recoveries of BAS 510 F, 2-chloronicotinic acid, and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide from concurrent fortification samples (prepared at each test site) were 91% for BAS 510 F, 90% for 2-chloronicotinic acid and 86% for 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide, and indicated that the method was adequate (p. 17).

II. RESULTS AND DISCUSSION

1. APPLICATION MONITORS: The mean recoveries from the field application monitors were 82% and 72% of the target for the first and second applications, respectively, at the Ontario test site, 85% and 76%, respectively, at the Manitoba test site, and 102% and 95%, respectively, at the Alberta test site (Table I, p. 25).

2. RECOVERY FROM FIELD SPIKES: The mean recoveries of BAS 510 F from the field spiked samples (across all fortification events) were $86 \pm 4.0\%$, $79 \pm 4.2\%$, and $81 \pm 5.6\%$ of the applied for the samples fortified at the Ontario, Manitoba, and Alberta field sites, respectively (Appendix E, p. 285). Field spiked samples were not prepared for the degradates, 2-chloronicotinic acid and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide.

3. MASS ACCOUNTING: A mass balance was not determined.

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Table 8. Concentration of BAS 510 F residues expressed as mg/kg soil, in the Ontario plot.

Compound	Soil depth (cm)	Sampling times (application number or days following previous application)																	
		App1	1	2	3	App2	1	2	3	5	7	14	22	30	62	91	118	301	369
Parent compound (BAS 510 F)	0-7.5	0.373	0.449	0.494	0.451	0.860	0.782	0.728	0.785	0.788	0.485	0.745	0.429	0.251	0.376	0.187	0.396	0.192	0.176
	7.5-15	0.006	0.007	0.038	<0.01	0.005	0.023	0.004	<0.01	0.004	<0.01	0.006	<0.01	0.020	0.019	0.099	0.097	0.022	0.022
	15-30	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Transformatio n product (2-chloronicotinic acid)	0-7.5	0.012	<0.01	<0.01	<0.01	0.012	0.013	0.004	0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	7.5-15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	15-30	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Transformatio n product (2-hydroxy-N-(4-chlorobipheny l-2-yl) nicotinamide)	0-7.5	<0.01	<0.01	<0.01	<0.01	<0.01	0.008	<0.01	0.006	0.003	0.004	0.004	<0.01	<0.01	<0.01	<0.01	0.040	<0.01	<0.01
	7.5-15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	15-30	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total extractable residues (if determined)	0-7.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	7.5-15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	15-30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total non-extractable residues (if determined)	0-7.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	7.5-15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	15-30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total recovery	0-7.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	7.5-15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	15-30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Data obtained from Tables XI-XIII, pp. 48-50.

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Reported values are registrant-calculated averages of three replicates. In instances where there was a non-detect in one or more of the replicates, the registrant used the value zero in place of each non-detect in their calculation to determine the mean, thus resulting in some mean values that are below the LOD (0.01 mg/kg).
ND = Not determined

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Table 9. Concentration of BAS 510 F residues expressed as mg/kg soil, in the Manitoba plot.

Compound	Soil depth (cm)	Sampling times (application number or days following previous application)															
		App1	2	3	App2	1	2	3	5	7	14	21	32	59	92	275	360
Parent compound (BAS 510 F)	0-7.5	0.400	0.143	0.214	0.446	0.602	0.506	0.608	0.325	0.396	0.400	0.344	0.326	0.336	0.421	0.338	0.314
	7.5-15	<0.01	<0.01	<0.01	<0.01	0.004	0.006	0.004	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.006	<0.01
	15-30	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Transformation product (2-chloronicotinic acid)	0-7.5	0.015	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	7.5-15	0.003	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	15-30	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Transformation product (2-hydroxy-N-(4-chlorobiphenyl-1-yl)nicotinamide)	0-7.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	7.5-15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	15-30	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total extractable residues (if determined)	0-7.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	7.5-15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	15-30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total non-extractable residues (if determined)	0-7.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	7.5-15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	15-30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total recovery	0-7.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	7.5-15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	15-30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Data obtained from Tables XIV-XVI, pp. 51-53. Reported values are registrant-calculated averages of three replicates. In instances where there was a non-detect in one or more of the replicates, the registrant used the value zero in place of each non-detect in their calculation to determine the mean, thus resulting in some mean values that are below the LOD (0.01 mg/kg). ND = Not determined

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Table 10. Concentration of BAS 510 F residues expressed as mg/kg soil, in the Alberta plot.

Compound	Soil depth (cm)	Sampling times (application number or days following previous application)																
		App1	1	2	5	App2	1	3	5	6	7	14	21	30	58	79	303	358
Parent compound (BAS 510 F)	0-7.5	0.449	0.392	0.414	0.312	0.780	0.787	0.727	0.715	0.807	0.770	0.718	0.653	0.775	0.661	0.746	0.397	0.488
	7.5-15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	15-30	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Transformation product (2-chloronicotinic acid)	0-7.5	0.019	0.006	0.015	0.006	0.014	0.014	0.013	0.012	0.014	0.003	0.003	0.004	0.004	<0.01	<0.01	<0.01	<0.01
	7.5-15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	15-30	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Transformation product (2-hydroxy-N-(4'-chlorobiphenyl-1-2-yl)nicotinamide)	0-7.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.004	0.005	0.009	0.008	0.014	<0.01	0.010
	7.5-15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	15-30	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total extractable residues (if determined)	0-7.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	7.5-15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	15-30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total non-extractable residues (if determined)	0-7.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	7.5-15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	15-30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total recovery	0-7.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	7.5-15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	15-30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Data obtained from Tables XVII-XIX, pp. 54-56. Reported values are registrant-calculated averages of three replicates. In instances where there was a non-detect in one or more of the replicates, the registrant used the value zero in place of each non-detect in their calculation to determine the mean, thus resulting in some mean values that are below the LOD (0.01 mg/kg). ND = Not determined

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4. PARENT COMPOUND: At the Ontario site, the maximum measured concentration following the second application (day 0) was 0.409 mg a.i./kg soil (after adjusting for the concentration present 2 days prior to the second application), which is 82% of the applied rate (registrant-calculated based on the zero-time core concentration, 0.50 mg/kg; Table II, p. 25). BAS 510 F was detected in the 0-7.5 cm depth at 0.373-0.451 mg a.i./kg soil from 0-3 days following the first application, was a maximum of 0.860 mg a.i./kg soil immediately following the second application, decreased to 0.429 mg a.i./kg soil by 22 days, was variable from 0.187 to 0.396 mg a.i./kg soil from 30 to 301 days, and was 0.176 mg a.i./kg soil at 369 days posttreatment (the last sampling interval; Table XI, p. 48). BAS 510 F was detected in the 7.5-15 cm depth at a maximum of 0.099 mg a.i./kg soil at 91 days following the second application and was detected at 0.022 mg a.i./kg soil at 301 and 369 days posttreatment. BAS 510 F was not detected below the 7.5-15 cm depth at any sampling interval.

At the Manitoba site, the maximum measured concentration following the second application (3 days) was 0.394 mg a.i./kg soil (after adjusting for the concentration present 2 days prior to the second application), which is 79% of the applied rate (registrant-calculated based on the zero-time core concentration, 0.50 mg/kg; Table II, p. 25). BAS 510 F was detected in the 0-7.5 cm depth at 0.400 mg a.i./kg soil immediately following the first application, decreased to 0.214 mg a.i./kg soil by 3 days (2 days prior to the second application), was 0.446 mg a.i./kg soil immediately following the second application, was a maximum of 0.608 mg a.i./kg soil at 3 days following the second application, and was variable from 0.314 to 0.421 mg a.i./kg soil from 5 to 360 days posttreatment (the last sampling interval; Table XIV, p. 51). BAS 510 F was detected in the 7.5-15 cm depth at a maximum of 0.006 mg a.i./kg soil at 2 and 275 days following the second application and was not detected below the 7.5-15 cm depth at any sampling interval.

At the Alberta site, the maximum measured concentration following the second application (6 days) was 0.495 mg a.i./kg soil (after adjusting for the concentration present 2 days prior to the second application), which is 99% of the applied rate (reviewer-calculated based on the registrant-calculated zero-time core concentration, 0.50 mg/kg; Table II, p. 25). BAS 510 F was detected in the 0-7.5 cm depth at 0.449 mg a.i./kg soil immediately following the first application, was 0.312 mg a.i./kg soil at 5 days (2 days prior to the second application), ranged from 0.715 to 0.787 mg a.i./kg soil from 0 to 5 days following the second application, was a maximum of 0.807 mg a.i./kg soil at 6 days, was variable from 0.653 to 0.775 mg a.i./kg soil from 7 to 79 days, and was 0.397-0.488 mg a.i./kg soil from 303 to 358 days posttreatment (the last sampling interval; Table XVI, p. 54). BAS 510 F was not detected below the 0-7.5 cm depth at any sampling interval.

The 50% dissipation times (DT50) of BAS 510 F in soil under terrestrial field conditions using non-linear regression (using the Gustafson/Holden equation; Ontario and Manitoba test sites) or linear regression (Alberta test site) were (pp. 18-21, Table III, p. 26, Figures 4-6, pp. 27-28):

Ontario	DT50 = 30.0 days	DT75 = 353 days
Manitoba	DT50 = 316 days	DT75 = >360 days
Alberta	DT50 = 372 days	DT75 or DT90 = Not calculated

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The dissipation pattern was not clear due to temporal and inter-replicate data variability. Additionally, the half-lives for all three sites are of questionable value due to temporal and inter-replicate data variability at all sites and insufficient sampling intervals (i.e., no sampling between 79 and 303 days) at the Alberta site.

5. TRANSFORMATION PRODUCTS: The transformation products detected in the Ontario test plot were 2-chloronicotinic acid and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide (M510F49), with maximum concentrations of 0.013 mg/kg and 0.040 mg/kg (1.3% and 4.0% of the applied amount, respectively) observed at 1 and 118 days following the second application, respectively, in the 0-7.5 cm soil layer (Tables XII-XIII, pp. 49-50). Neither degradate was detected at the end of the study period.

The transformation product detected in the Manitoba test plot was 2-chloronicotinic acid, with a single detection at 0.015 mg/kg in the 0-7.5 cm soil layer (1.5% of the applied amount) and 0.003 mg/kg in the 7.5-15 cm soil layer (0.3%) observed immediately following the first application (Tables XV-XVI, pp. 52-53). 2-chloronicotinic acid was not detected at the end of the study period.

The transformation products detected in the Alberta test plot were 2-chloronicotinic acid and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide (M510F49), with maximum concentrations of 0.019 mg/kg and 0.014 mg/kg (1.9% and 1.4% of the applied amount, respectively) observed immediately following the first application and at 79 days following the second application, respectively, in the 0-7.5 cm soil layer (Tables XVIII-XIX, pp. 55-56). 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide was detected at 0.010 mg/kg at the end of the study period, while 2-chloronicotinic acid was not detected.

Table 11: Chemical names and CAS numbers for the transformation products of BAS 510 F.

Applicant's Code Name	CAS Number	CAS and/or IUPAC Chemical Name(s)	Chemical formula	Molecular weight	SMILES string
CNA		2-chloronicotinic acid	C ₆ H ₄ ClNO ₂	157.56	
M510F49		2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide	C ₁₈ H ₁₃ ClN ₂ O ₂	324.77	

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

Table 12: Dissipation routes of BAS 510 F under field conditions.

Route of dissipation	% of applied amount (at the end of study period)		
	Ontario test site	Manitoba test site	Alberta test site
Accumulation (residues) in soil/carry over ¹	19.8%	31.4%	48.8%
Transformation (% of transformation products) ¹	0%	0%	1%

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Route of dissipation	% of applied amount (at the end of study period)		
	Leaching, if measured	Did not leach beyond 15 cm	Did not leach beyond 15 cm
Volatilization, if measured	Not measured	Not measured	Not measured
Plant uptake, if measured	N/A	N/A	N/A
Runoff, if measured	Not measured	Not measured	Not measured
Total			

Accumulation in soil and transformation were calculated by the reviewer by dividing the total parent BAS 510 F residues at the end of the study period or the total transformation products at the end of the study period by the total application rate (1.12 kg a.i./ha).

7. VOLATILIZATION: The concentration of applied BAS 510 F lost through volatilization was not determined.

8. PLANT UPTAKE: N/A

9. LEACHING: BAS 510 F did not leach below 7.5 cm in the Alberta test plot and below 15 cm in the Ontario and Manitoba test plots (Tables XI, XIV, and XVII, pp. 48, 51, and 54). Maximum concentrations of BAS 510 F were 0.608-0.860 mg a.i./kg soil in the 0-7.5 cm depth and 0.006-0.099 mg a.i./kg soil in the 7.5-15 cm depth (Ontario and Manitoba test plots only). The transformation products 2-chloronicotinic acid and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide generally did not leach beyond the 0-7.5 cm layer (Tables XII, XIII, XV, XVI, XVIII, and XIX, pp. 49, 50, 52, 53, 55, and 56). TDR water flux measurements indicated that recharge occurred in all three test plots at the four foot depth (Figures 9-11, pp. 32-34).

10. Runoff: Runoff was not studied.

11. RESIDUE CARRYOVER: DT75 values were 353 days for the Ontario test site and >360 days for the Manitoba test site (Table III, p. 26). A DT75 was not calculated for the Alberta test site. After 358-369 days, 19.8%, 31.4%, and 48.8% of the total applied parent compound (1.0 mg/kg, based on the registrant-calculated concentration for a single application, reported as 0.50 mg/kg; Table II, p. 25) was detected in the Ontario, Manitoba, and Alberta test plots, and has the potential to carryover into the following season. No transformation products were detected above 1% at the end of the study period at any of the test sites.

12. SUPPLEMENTARY STUDY RESULTS: Based on data reported in the method validation study MRID 45405225, using BASF Method D0004, mean recoveries of BAS 510 F were 96%, 97%, and 94% for the 0.01, 0.1, and 1.0 ppm fortifications, respectively, and mean recoveries of 2-chloronicotinic acid were 92%, 88%, and 87% for the 0.01, 0.1, and 1.0 ppm fortifications, respectively (Appendix E, Table VIII, p. 106). Using BASF Method D0004/1, mean recoveries of BAS 510 F were 96%, 95%, and 94% for the 0.01, 0.1, and 1.0 ppm fortifications, respectively, mean recoveries of 2-chloronicotinic acid were 93%, 96%, and 88% for the 0.01, 0.1, and 1.0 ppm fortifications, respectively, and mean recoveries of 2-hydroxy-N-(4'-chlorobiphenyl-2-

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yl)nicotinamide were 88%, 91%, and 92% for the 0.01, 0.1, and 1.0 ppm fortifications, respectively (Table III, p. 28). Results were not reported for 1-(4-chlorophenyl)-2-aminobenzene because they do not pertain to the study under review. Based on data reported in the independent method validation study **MRID 45405226**, using BASF Method D0004/1, mean recoveries of BAS 510 F were 82% and 95% for the 0.01 and 0.10 mg/kg fortifications, respectively, mean recoveries of 2-chloronicotinic acid were 91% and 94% for the 0.01 and 0.10 mg/kg fortifications, respectively, and mean recoveries of 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide were 84% and 91% for the 0.01 and 0.10 mg/kg fortifications, respectively (Table 1, p. 16).

Based on data reported in the storage stability study **MRID 45405224**, diphenyl ring-labeled ¹⁴C-BAS 510 F was stable in soil treated at a concentration of 0.930 mg/kg and stored frozen for up to 2 years. Mean recoveries (from duplicate replicates) ranged from 98.5% to 106.9% throughout the storage period (Table 2, p. 19). Based on data reported in the storage stability study **MRID 45405223**, BAS 510 F and 2-chloronicotinic acid were stable in soil treated at 0.1 ppm and stored frozen for up to 6 months. Recoveries of both compounds ranged from 88% to 105% throughout the storage period (Tables I.A-I.B, pp. 23-24). Recoveries of 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide decreased from 99-111% at day 0 to 70-76% by 1 month and 75-84% by 3 months posttreatment (Tables II.A-II.B, p. 25).

III. STUDY DEFICIENCIES: No deficiencies were noted other than data variability in the results which affected the determination of the half-lives at each of the three sites.

IV. REVIEWER'S COMMENTS:

1. The major routes of dissipation of BAS 510 F under terrestrial field conditions at Ontario, Manitoba, and Alberta could not be determined from the data provided in this report. Leaching was minimal and the major transformation products did not show a pattern of accumulation. Volatilization and runoff were not measured. Based on laboratory studies that demonstrated that the transformation of BAS 510 F resulted primarily from bound residue and CO₂ formation, it is assumed that these were also the predominant dissipation processes in the field. However, the half-lives for all three sites are of questionable value (see Comment #2).
2. The registrant-calculated DT50 of BAS 510 F at the Ontario test plot was 30 days, and was comparable to the observed half-life and the reviewer-calculated half-life (45 days, $r^2 = 0.62$, calculated using linear regression) when only 0-91 day data were utilized. However, temporal and inter-replicate data variability precluded the accurate determination of a half-life for the Ontario site. Mean concentrations of greater than 50% of the maximum were observed in at least one replicate at 62, 118 and 369 days at the Ontario site. The registrant-calculated DT50s of BAS 510 F at the Manitoba and Alberta test plots were 316 days and 372 days, respectively, and were significantly more rapid than the corresponding reviewer-calculated values of 990 days ($r^2 = 0.02$) and 462 days ($r^2 = 0.39$) which were calculated using linear regression (all available data). The reviewer

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- notes that data from these test plots were variable between replicates and over time. The data for the Manitoba and Alberta sites indicate that the half-lives at these sites were greater than the duration of the study. The half-life at the Alberta site is of questionable value also due to insufficient sampling intervals (i.e., no sampling between 79 and 303 days). The reviewer also notes that the registrant-calculated half-lives were calculated based on the total residue concentration per sampling period (all soil depths) and that the reviewer-calculated half-lives were calculated based on only the top 0-7.5 cm soil depth.
3. The study authors stated that the degradation of BAS 510 F is primarily a function of soil microbial activity, and accurately predicted half-life values (within a variance of 27 days) using a model based on the accumulation of soil heat units (pp. 22-24). Results were reported in Table IV (p. 30) and shown graphically in Figure 8 (p. 29).
 4. The reviewer notes that samples collected 1 day prior to the second application at each site were either not analyzed or data were not reported.
 5. The study authors stated that some soil cores could not be collected due to frozen ground (Appendix B, p. 108).
 6. Evapotranspiration data were reported for each test location in place of pan evaporation data.
 7. The reviewer notes that mean concentration data reported at levels of lower than the limit of quantitation (0.01 ppm) reflect the observation of the respective compounds in fewer than the total number of replicates analyzed.
 8. BAS 510 F chemical name 2-chloro-*N*-(4'-chlorobiphenyl-2-yl)-nicotinamide, as presented in the study report, was identified as the IUPAC name by the Compendium of Pesticide Common Names (<http://www.hclrss.demon.co.uk/nicobifen.html>). The CAS name 2-chloro-*N*-(4-chloro[1,1-biphenyl]-2-yl)-3-pyridinecarboxamide was also obtained from the Compendium of Pesticide Common Names. The following BAS 510 F synonyms were obtained from USEPA/OPP Chemical Databases (<http://www.cdpr.ca.gov/cgi-bin/epa/chemidtriris.pl?pccode=128008> and (http://www.cdpr.ca.gov/cgi-bin/mon/bycode.pl?p_chemcode=5790): 2-chloro-*N*-(4'-chlorobiphenyl-2-yl)-nicotinamide, nicobifen, and BAS 516 02 F.

V. REFERENCES:

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Biodegradation kinetics for pesticide exposure assessment. Reviews of environmental contamination and toxicology.

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Pages 26 through 27 are not included in this copy.

The material not included contains the following type of information:

- Identity of product inert ingredients.
- Identity of product impurities.
- Description of the product manufacturing process.
- Description of quality control procedures.
- Identity of the source of product ingredients.
- Sales or other commercial/financial information.
- A draft product label.
- The product confidential statement of formula.
- Information about a pending registration action.
- FIFRA registration data.
- The document is a duplicate of page(s) .
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Chemical Name
PC Code
MRID
Guideline No.

BAS 510 F
128008
45405222
164-1

Ontario

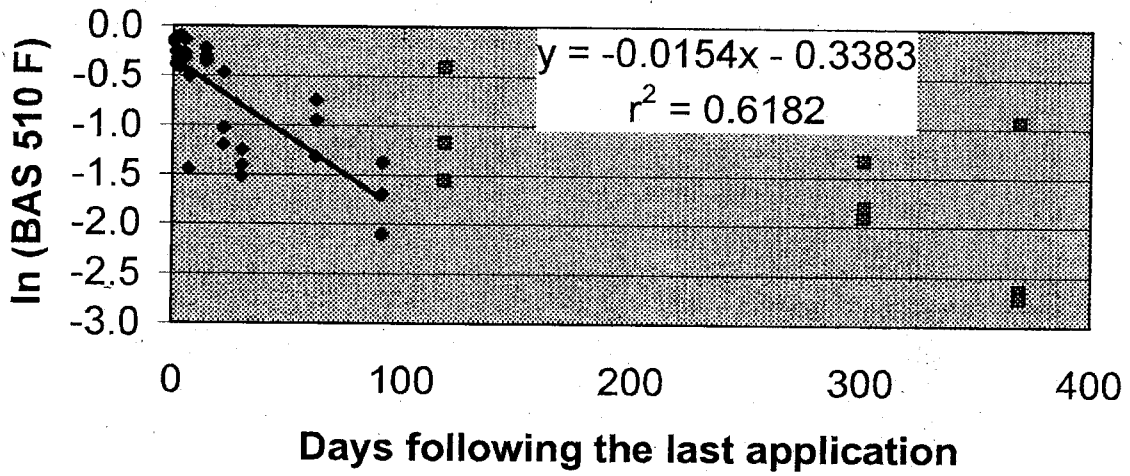
Half-life (days) = 45.0

Days posttreatment of the last application	BAS 510 F (mg/kg)	Ln (BAS 510 F)
0	0.868	-0.142
0	0.862	-0.149
0	0.850	-0.163
1	0.771	-0.260
1	0.891	-0.115
1	0.684	-0.380
2	0.775	-0.255
2	0.688	-0.374
2	0.721	-0.327
3	0.662	-0.412
3	0.907	-0.098
5	0.762	-0.272
5	0.875	-0.134
5	0.726	-0.320
7	0.604	-0.504
7	0.614	-0.488
7	0.236	-1.444
14	0.801	-0.222
14	0.698	-0.360
14	0.735	-0.308
22	0.359	-1.024
22	0.301	-1.201
22	0.628	-0.465
30	0.221	-1.510
30	0.287	-1.248
30	0.245	-1.406
62	0.268	-1.317
62	0.387	-0.949
62	0.474	-0.747
91	0.254	-1.370
91	0.122	-2.104
91	0.184	-1.693
118	0.309	-1.174
118	0.668	-0.403
118	0.211	-1.556
301	0.149	-1.904
301	0.263	-1.336
301	0.164	-1.808
369	0.071	-2.645
369	0.391*	-0.939
369	0.066	-2.718

* Reviewer-calculated average of two replicates

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Dissipation of BAS 510 F from the Ontario bare-ground plot



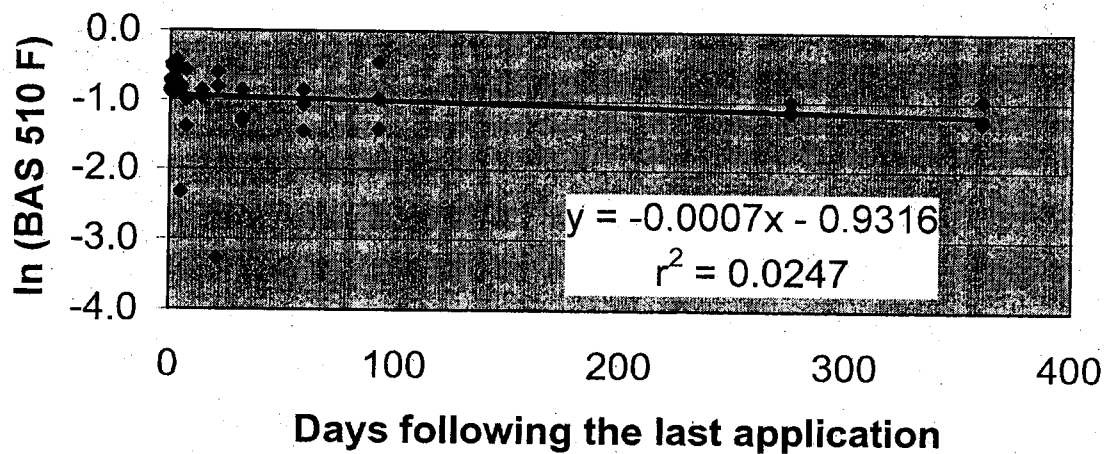
Chemical Name
PC Code
MRID
Guideline No.

BAS 510 F
128008
45405222
164-1

Manitoba
Half-life (days) = 990.2

Days posttreatment of the last application	BAS 510 F (mg/kg)	Ln (BAS 510 F)
0	0.488	-0.717
0	0.433	-0.837
0	0.418	-0.872
1	0.593	-0.523
1	0.622	-0.475
1	0.590	-0.528
2	0.584	-0.538
2	0.436	-0.830
2	0.497	-0.699
3	0.565	-0.571
3	0.608	-0.498
3	0.652	-0.428
5	0.097	-2.333
5	0.431	-0.842
5	0.448	-0.803
7	0.251	-1.382
7	0.372	-0.989
7	0.566	-0.569
14	0.394	-0.931
14	0.424	-0.858
14	0.383	-0.960
21	0.038	-3.270
21	0.548	-0.601
21	0.447	-0.805
32	0.284	-1.259
32	0.270	-1.309
32	0.423	-0.860
59	0.235	-1.448
59	0.347	-1.058
59	0.426	-0.853
92	0.642	-0.443
92	0.377	-0.976
92	0.243	-1.415
275	0.327	-1.118
275	0.315	-1.155
275	0.371	-0.992
360	0.274	-1.295
360	0.381	-0.965
360	0.286	-1.252

Dissipation of BAS 510 F from the Manitoba bare-ground plot



Chemical Name
PC Code
MRID
Guideline No.

BAS 510 F
128008
45405222
164-1

Alberta

Half-life (days) = 462.1

Days posttreatment of the last application	BAS 510 F (mg/kg)	Ln (BAS 510 F)
0	0.829	-0.188
0	0.731	-0.313
1	0.811	-0.209
1	0.763	-0.270
3	0.750	-0.288
3	0.658	-0.419
3	0.774	-0.256
5	0.837	-0.178
5	0.642	-0.443
5	0.665	-0.408
6	0.750	-0.288
6	0.864	-0.146
7	0.797	-0.227
7	0.742	-0.298
14	0.527	-0.641
14	0.469	-0.757
14	1.159	0.148
21	0.473	-0.749
21	1.022	0.022
21	0.463	-0.770
30	1.015	0.015
30	0.678	-0.389
30	0.573	-0.557
58	0.741	-0.300
58	0.690	-0.371
58	0.551	-0.596
79	0.957	-0.044
79	0.578	-0.548
79	0.702	-0.354
303	0.324	-1.127
303	0.397	-0.924
303	0.469	-0.757
358	0.396	-0.926
358	0.584	-0.538
358	0.485	-0.724

Dissipation of BAS 510 F from the Alberta bare-ground plot

