TEXT SEARCHABLE DOCUMENT 2009

Data Evaluation Record on the terrestrial field dissipation of saflufenacil

PMRA Document Number 1546870 EPA MRID Number 47128234
PMRA Submission Number 2008-0430

Data Requirement: PMRA Data Code: 8.3.2.2
EPA DP Barcode: 349858
OECD Data Point: IIIA 9.2.1
EPA Guideline: 835.6100

Test material: Saflufenacil

End Use Product name: BAS 800 UC H **Concentration of a.i.:** 120 g ai/L
Formulation type: Emulsifiable concentrate

Test material

Common name: Saflufenacil.

Chemical name:

IUPAC name: N′-{2-Chloro-4-fluoro-5-[1,2,3,6-tetrahydro-3-methyl-2,6-dioxo-4-(trifluoromethyl)pyrimidin-1-yl]benzoyl}-N-isopropyl-N-methylsulfamide.
N'-[2-Chloro-4-fluoro-5-(3-methyl-2,6-dioxo-4-(trifluoromethyl)-3,6-dihydro-1(2H)-pyrimidinyl)benzoyl]-N-isopropyl-N-methylsulfamide.

CAS name: 2-Chloro-5-[3,6-dihydro-3-methyl-2,6-dioxo-4-(trifluoromethyl)-1(2H)-pyrimidinyl]-4-fluoro-N-[[methyl(1-methylethyl)amino]sulfonyl]benzamide.

CAS No.: 372137-35-4.

Synonyms BAS 800 H, CL No. 433379, 4054449, AC 433,379.

Smiles string: N1(C)C(C(F)(F)F)=CC(=O)N(C2=CC(C(=O)NS(=O)(=O)N(C)C(C)C)=C(Cl)C=C2F)C1=O (EPI Suite v3.12 SMILES string from ISIS .MOL).

EPA Reviewer:	Greg Orrick USEPA	**Signature:** **Date:**	Greg Orrick June 8, 2009
PMRA Reviewer:	Janine Glaser (1009) HC-PMRA-EAD	**Signature:** **Date: 2008 November 28**	
APVMA Reviewer:	Daryl Murphy DEWHA/APVMA	**Signature:** **Date:**	D. Murphy

Company Code: BAZ
Active Code: SFF
Use Site Category: 13 and 14
EPA PC Code: 118203

CITATION: Jordan, J.M., M.G. Saha, and R.L. Warren. 2007. Terrestrial field dissipation of BAS 800 H in pine/vegetation management use patterns. Unpublished study performed by BASF Agro Research, Research Triangle Park, North Carolina, Agvise Laboratories, Inc., Northwood,

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Data Evaluation Record on the terrestrial field dissipation of saflufenacil

PMRA Submission Number {.....} EPA MRID Number 47128234

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EPA DP Barcode: D349858
OECD Data Point: IIA 7.3.1, IIIA 9.2.1
EPA Guideline: 835.6100
OPPTS Guideline: 835.6100

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Company Code
Active Code
Use Site Category
EPA PC Code: 118203

North Dakota (soil characterization), and Research Options, Inc., Montezuma, Georgia (field phase); sponsored and submitted by BASF Agro Research, Research Triangle Park, North Carolina. BASF Study No.: 132665. BASF Reg. Doc. No.: 2007/7009866. Experiment initiation October 25, 2005, and completion June 1, 2007 (p. 8). Final report issued December 7, 2007.

EXECUTIVE SUMMARY

Soil dissipation/accumulation of saflufenacil (BAS 800 H; N′-{2-chloro-4-fluoro-5-[1,2,3,6-tetrahydro-3-methyl-2,6-dioxo-4-(trifluoromethyl)pyrimidin-1-yl]benzoyl}-N-isopropyl-N-methylsulfamide) under U.S. field conditions was studied using a bare plot of sandy loam soil at one site in Georgia (Ecoregion 8.3.5). The experiment was carried out in accordance with the USEPA Pesticide Assessment Guideline Subdivision N 164-1, and in compliance with the USEPA FIFRA (40 CFR, Part 160) GLP standard. Saflufenacil was broadcast once at a target application rate of 0.40 kg a.i./ha (0.357 lb a.i./A) to the bare plot, which was divided into three replicate subplots, each *ca.* 11 x 23 m in size. The test application was made at the proposed label rate for the pine control use pattern. Total water input (precipitation plus irrigation) during the study period was approximately 81.1 inches or 122% of the historical average. A control plot (bare ground) was located 213 m from the nearest treated plot.

The application rate was verified using ten Speedisk™'s placed randomly in each of the three replicate subplots (30 total), with mean recovery of saflufenacil ranging from 79.9 to 98.2% of the theoretical, based on the target application rate. Field spikes were prepared by fortifying untreated soil samples with saflufenacil at 2.5 µg/g at various sampling intervals. The field spikes were transported and stored under the same conditions as the test samples. The overall mean recovery of saflufenacil from field spikes was 119%. Field spikes were stored for up to 524 days prior to analysis.

Soil samples were collected at –1, 0, 1, 2, 4, 6, 8, 10, 15, 20, 32, 46, 59, 75, 90, 121, 150, 182, 271, 360, and 451 days posttreatment to a depth of 0-120 cm. Soil samples were extracted by shaking with acetonitrile followed by acetonitrile:water (40:60, v:v). The extracts were diluted and analyzed for saflufenacil and the transformation products M800H01 (N-[2-chloro-4-fluoro-5-(3-methyl-2,6-dioxo-4-(trifluoromethyl)-3,6-dihydro-1(2H)-pyrimidinyl)benzoyl]-N'-isopropylsulfamide), M800H02 (N'-[2-chloro-5-(2,6-dioxo-4-(trifluoromethyl)-3,6-dihydropyrimidin-1(2H)-yl)-4-fluorobenzoyl]-N-isopropyl-N-methylsulfamide), M800H07 (N-{4-chloro-2-fluoro-5 [({[isopropyl(methyl)amino]sulfonyl}amino)carbonyl]phenyl}-N'-methylurea), M800H08 (N'-[2-chloro-4-fluoro-5-(3-methyl-2,6-dioxo-4-(trifluoromethyl)tetrahydro-1(2H)-pyrimidinyl)benzoyl]-N-isopropyl-n-methylsulfamide), M800H22 (3-[({4-chloro-2-fluoro-5-[({[isopropyl(methyl)-amino]sulfonyl}amino)carbonyl]anilino}carbonyl)(methyl)amino]-4,4,4-trifluorobutanoic acid), and M800H15 (N-{4-chloro-2-fluoro-5-[({[isopropyl(methyl)amino]sulfonyl}-amino)carbonyl]phenyl}-4-4-4-trifluoro-3,3-dihydroxybutanamide) using LC/MS/MS operated in the positive ion mode. The LOQ was 0.01 mg/kg and the LOD was 0.002 mg/kg for all analytes. Soil samples were stored frozen for up to 19 months prior to analysis.

The mean measured zero-time concentration of saflufenacil in the 0-7.5 cm soil depth was 0.19 ppm or 57.3% of the theoretical (the percent recovery was reviewer-calculated based on a theoretical day 0 recovery of 0.331 ppm for the 0-7.5 cm soil depth), and was a maximum mean of 0.20 ppm (60.4% of the theoretical) at 1 and 4 days posttreatment. Saflufenacil decreased to 0.12 ppm by 8 days, 0.06 ppm by 10 days, and was last detected above the LOQ at 0.01 ppm (two replicate detections) at 32 days posttreatment. Saflufenacil was detected in the 7.5-15 cm soil depth at a maximum of 0.19 ppm at 6 days posttreatment. Saflufenacil was detected twice in the 15-30 cm soil depth at 0.01-0.02 ppm (single replicate detection or mean of two replicate detections) at 10 and 15 days, twice in the 30-45 cm soil depth at 0.01 ppm (single replicate detection or mean of two replicate detections) at 20 and 32 days posttreatment, and once in the 45-60 cm soil depth at 0.01 ppm at 32 days (single replicate detection).

The transformation product **M800H08** was detected in the 0-7.5 cm soil depth at a maximum mean concentration of 0.04 ppm (which is equal to 12.0% of the theoretically applied and 21.0% of the initial soil concentration of saflufenacil) at day 0, decreased to 0.02 ppm at 1 to 2 days, increased to 0.03 ppm (two replicate detections) at 6 days, was 0.02 ppm at 10 to 15 days, and was not detected above the LOQ after 15 days posttreatment. M800H08 was detected in the 7.5-15 cm soil depth at a maximum of 0.05 ppm (single replicate detection; 15.1% of the theoretical) at 6 days posttreatment. M800H08 was not detected above the LOQ in the 15-30 cm depth, and was detected at ≤0.02 ppm (mean of detections was above the LOQ) in the 30-45 cm depth at 32 and 46 days, in the 45-60 cm depth at 32 to 121 days, in the 60-75 cm depth at 46 to 121 days at 46, 90, and 121 days (75-90 cm depth), and in the 90-105 cm depth at 46 and 75 days posttreatment.

The transformation product **M800H01** was detected in the 0-7.5 cm soil depth at a maximum mean concentration of 0.02 ppm (which is equal to 6.2% of the theoretically applied and 10.8% of the initial soil concentration of saflufenacil) from 0-8 days. M800H01 was not detected above the LOQ in soil below the 7.5-15 cm depth.

The transformation product **M800H02** was detected in the 0-7.5 cm soil depth at a maximum mean concentration of 0.01 ppm (which is equal to 3.1% of the theoretically applied and 5.4% of the initial soil concentration of saflufenacil) at 0, 1, 2, and 6 days. M800H02 was not detected above the LOQ in soil below the 0-7.5 cm depth.

Under field conditions in the bare soil plot, saflufenacil dissipated from the top 7.5 cm of soil with a half-life of 5.9 days ($r^2 = 0.771$); calculated using linear regression on replicate data following the maximum mean detection (*i.e.*, 1- to 32-day data) and assuming that concentrations less than the LOQ were one-half the LOQ (*i.e.*, 0.005 ppm). DT75 and DT90 values were 11.8 days and 19.6 days, respectively. Saflufenacil and its transformation products were not available for carryover at the end of the study period; residues were not detected above the LOQ after 121 days posttreatment.

The major routes of dissipation of saflufenacil under terrestrial field conditions in the bare plot included transformation and leaching.

RESULTS SYNOPSIS

Location/soil type: Macon County, Georgia/Sandy loam (0-120 cm).
Upper 7.5 cm of soil (reviewer-calculated):
DT50: 5.9 days ($r^2 = 0.771$).
DT75: 11.8 days.
DT90: 19.6 days.

Whole soil profile (study values confirmed by PMRA reviewer):
DT50: 10.7 days ($r^2 = 0.924$).
DT75: 21.4 days.
DT90: 35.5 days.

Transformation products detected: M800H01, M800H02, and M800H08.
Dissipation routes: Transformation and leaching.

Study Acceptability: This study is classified **acceptable/fully reliable**. No significant deviations from good scientific practices were noted.

I. MATERIALS AND METHODS

GUIDELINE FOLLOWED: The study was conducted according to USEPA Pesticide Assessment Guidelines Subdivision N, 164-1, OPPTS 835.6100, and the NAFTA Guidance Document for Conducting Terrestrial Field Dissipation Studies (pp. 9, 13). No significant deviations from the objectives of Subdivision N guidelines were noted.

COMPLIANCE: The study was conducted in compliance with USEPA FIFRA (40 CFR, Part 160) Good Laboratory Practice standards (pp. 3, 9, 13). Signed and dated Data Confidentiality, GLP Compliance, Quality Assurance, and Certification of Authenticity statements were provided (pp. 2-3, 5). A signed but not dated Quality Assurance statement was provided (p. 4).

A. MATERIALS:

1. Test Material Saflufenacil (BAS 800 H; p. 13; Table 1, p. 27).

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

Description: Cream-colored liquid (Table 3, p. 29).

Storage conditions of test chemicals: Not reported.

Physico-chemical properties of saflufenacil:

Parameter		Value	Comment
Molecular weight (g/Mol)		500.86	
Molecular formula		$C_{17}H_{17}ClF_4N_4O_5S$	
Water solubility (mg/L)	pH 4, 20°C: pH 5, 20°C: pH 7, 20°C: pH 9, 20°C:	14 (pH 4, 20°C) 25 (pH 5, 20°C) 2100 (pH 7, 20°C) Not determined due to degradation.	
Vapor pressure	20°C: 25°C:	4.5×10^{-15} Pa 2.0×10^{-14} Pa	Indicates nonvolatility.
UV Absorption	pH 1, pH 7: pH 12:	UV/VIS λmax = 272 nm UV/VIS λmax = 309 nm	Indicates possible susceptibility to direct photolysis at alkaline pH.
pKa		4.41	Indicates neutrality at ambient pH.
K_{ow} log K_{ow}		368 2.56	Indicates low potential to bioconcentrate.
Stability of compound at room temperature		Stable for >2 yrs.	

Data obtained from Genari, 2007 (MRID 47127814); Beery, 2007 (MRID 47127815); Beery, 2006 (MRID 47127817); Vanhook, 2005 (MRID 47127818); Vanhook, 2005a (MRID 47127819); and Kroel, 2005 (MRID 47127821).

2. Test site: The test site was located near the city of Montezuma, in Macon County, Georgia (p. 13; Table 4, p. 29). The study authors stated that the test site was located in an area representative of the pine plantation or general vegetation management use patterns (p. 10). The test site soil was a sandy loam (0-105 cm; Table 5, p. 30; see footnote to Table 3). Glyphosate and 2,4-D were applied to the test plots in 2003 and/or 2004.

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

Details		Test site
Geographic coordinates	Latitude	N32°14.553'
	Longitude	W84°00.115'
	Province/State	Georgia
	Country	US
	Ecoregion	8.3.5
Slope Gradient		<1%
Depth to ground water (m)		*ca.* 7.6 m
Distance from weather station used for climatic measurements		Daily precipitation, minimum and maximum air temperature, wind speed and direction, solar radiation, percent humidity, and other climatic measurements were collected on-site or from nearby weather stations (*ca.* 0.5 miles SW of plots).
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 81.1 inches or approximately 122% of the historical average rainfall expected during the study period.

Data were obtained from p. 13; Table 4, p. 29; Table 6, p. 30; and Tables 10-11, p. 33 of the study report.

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

Use	Year	Test site
Crops grown	Previous year	Fallow
	2 years previous	Wheat
	3 years previous	Wheat
Pesticides used	Previous year	None
	2 years previous	Glyphosate and 2,4-D
	3 years previous	2,4-D
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 4, p. 29 of the study report.

3. Soils:

Table 3: Properties of the soil from the test site.

Property	Depth (cm)						
	0-15	**15-30**	**30-45**	**45-60**	**60-75**	**75-90**	**90-105**
Textural classification[1]	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam
% Sand	79	79	77	79	77	77	77
% Silt	12	10	8	6	8	8	6
% Clay	9	11	15	15	15	15	17
pH (saturated paste)	6.2	6.3	5.8	5.1	5.0	5.0	5.1
Organic matter (%)	1.0	0.7	0.3	0.2	0.1	0.1	0.1
Organic carbon (%)[2]	0.6	0.4	0.2	0.1	0.1	0.1	0.1
CEC (meq/100 g)	5.5	5.3	4.9	4.5	4.5	4.5	4.5
Bulk density (g/cm^3)[3]	1.61	1.73	1.64	1.58	1.56	1.60	1.47
Moisture at 1/3 atm (%)	7.2	7.3	7.7	7.6	7.6	9.0	9.2
Taxonomic classification (e.g., ferro-humic podzol)[4]	Loamy, kaolinitic, thermic arenic Plinthic Kandiudult.						
Soil mapping unit	Not reported.						

Data were obtained from p. 12 and Table 5, p. 30 of the study report.
1 Textural classifications were determined by the reviewer using the NRCS soil texture calculator http://soils.usda.gov/technical/aids/investigations/texture/, which calculates texture based on the percent sand and clay. The study authors reported that the soil texture for the 0-15 cm section was loamy sand. The reviewer notes that the soil texture falls along the loamy sand/sandy loam classification line.
2 Reviewer-calculated as % organic matter ÷ 1.72.
3 Undisturbed bulk density.
4 Taxonomic classification determined by study authors and confirmed by the reviewer from the soil series "Fuquay" p. 13 of the study report) and http://ortho.ftw.nrcs.usda.gov/cgi-bin/osd/osdname.cgi.

B. EXPERIMENTAL DESIGN:

1. Experimental design:

Table 4: Experimental design.

Details		Test site
Duration of study		451 days
Uncropped (bare) or cropped		Bare
Control used (Yes/No)		Yes
No. of replications	Controls	One
	Treatments	Three
Plot size (L x W m)	Controls	30.48 x 5.49 m
	Treatments	10.97 x 22.86 m
Distance between control plot and treated plot		213 m
Distance between treated plots		6.1 m
Application rate(s) used (g a.i/ha)		400 g a.i./ha
Was the maximum label rate per ha used in study? (Yes/No)		Yes[1]
Number of applications		One
Application Date(s) (dd mm yyyy)		25/10/2005
Concentration expected in the 0-7.5 cm soil zone, based on the target first application rate and soil density (mg a.i./kg soil)		0.331 mg a.i./kg soil[2]
Application method (eg., spraying, broadcast etc.)		Broadcast
Type of spray equipment, if used		Tractor mounted boom sprayer fitted with twelve Tee-Jet (110-04 XR) flat fan nozzles. PTO driven hydro roller pump with bypass agitation.
Total volume of spray solution applied/plot **OR** total amount broadcasted/plot		10.00 L
Identification and volume of carrier (e.g., water), if used		Water, 37.850 L
Name and concentration of co-solvents, adjuvants and/or surfactants, if used		D-W Surfactant, 0.380 L
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 Yes (at 5 cm) Yes
Indicate whether the Pan evaporation data were submitted		No, Penman evaporation data were reported.

Details		Test site
Meteoro-logical conditions during application	Cloud cover (%)	5
	Temperature (□C)	9.4
	Humidity	71%
	Wind speed and direction (mph)	2-4, direction not reported.
	Sunlight (hr)	Not reported
Pesticides used during study: Name of product/a.i conc.: Amount applied: Application method: Name of product/a.i conc.: Amount applied: Application method: Name of product/a.i conc.: Amount applied: Application method: Name of product/a.i conc.: Amount applied: Application method:		 Glyphosate Four applications at 1.0 lb a.i./A. Broadcast 2,4-D Two applications at 0.5 lb a.i./A. Broadcast Monosodium acid methanearsonate (MSMA) Two applications at 2.0 lb a.i./A. Broadcast Fomesafen sodium salt (Reflex) One application at 0.38 lb a.i./A. Broadcast
Supplemental irrigation used (Yes/No)[3] If yes, provide the following details: No. of irrigation: Interval between irrigation: Amount of water added each time: Method of irrigation:		Yes. 27 2-81 days 0.15-1.50 inches Overhead sprinkler
Indicate whether water received through rainfall + irrigation equals the 30 year average rainfall (Yes/No)		Yes
Were the application concentrations verified?		Yes
Were field spikes used?		Yes
Good agricultural practices followed (Yes or No)		Yes
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:		N/A

Details	Test site
Crop maintenance:	
Volatilization included in the study (Yes/No)	No
Leaching included in the study (Yes/No)	Yes
Run off included in the study (Yes/No)	No

Data were obtained from p. 10; pp. 13-14; Table 4, p. 29; Tables 6-10, pp. 30-33; Appendix A, pp. 47-62; Appendix D, pp. 370-375 of the study report.
1 The study authors stated that the applications were made according to the proposed label for the pine control use pattern (p. 10 of the study report).
2 Calculated using soil bulk density from the 0-15 cm soil depth.
3 Daily irrigation data were reported for October 2005-October 2006; daily irrigation data were not reported for the last three months of the study (Appendix D, pp. 370-375 of the study report). The number of irrigation events and amount of water added each time were obtained from Table 10 (p. 33 of the study report). The number of irrigation events that occurred through October 2006 was 23, with 0.15-1.25 inches of water added each time.

2. Application Verification: The application rate was verified for the bare plot using a product called Speedisk™, which resembles a short walled Buchner funnel with C18 placed in the "bottom" of the funnel (p. 13). To verify the application, ten Speedisk™'s were placed randomly in each of the three replicate subplots of the bare soil plot (30 total) prior to application (Table 12, p. 34). Following the test application, the Speedisk™'s were collected and used to create three composite samples (one per replicate plot). Speedisk™ samples were eluted with acetonitrile, and the extracts were serial diluted using acetonitrile:water (70:30, v:v) and analyzed for saflufenacil by LC/MS/MS, as described for the study soil samples (Appendix B, pp. 69-70).

3. Field Spiking: Field spikes were prepared by fortifying untreated soil samples (20 g, 1 mm sieved) with saflufenacil at 2.5 µg/g (pp. 13-14). Three field spike samples were prepared at the 0, 4, 10, 30, 90, 180, 360, and 450 day sampling intervals (Appendix B, Table III, pp. 17-18). The samples prepared at 450 days were not analyzed. Field spike samples were transported with and maintained under the same conditions as the test samples. Field spikes were analyzed within 524 days of storage.

4. Volatilization: Volatilization was not measured.

5. Leaching: Fifteen cores (five from each replicate plot) were collected from the treated bare plot at –1, 0, 1, 2, 4, 6, 8, 10, 15, 20, 32, 46, 59, 75, 90, 121, 150, 182, 271, 360, and 451 days posttreatment, to a depth of 0-120 cm, to determine the mobility of the test substance in the soil profile (p. 14; Table 12, p. 34).

To determine whether residues had an opportunity to move down through the soil profile, in field water content reflectometry (determined at soil depths of 0-30, 30-60, 60-90, and 90-120 cm) and a net water balance assessment based on cumulative daily precipitation, irrigation, and evapotranspiration were used to characterize site hydrologic conditions (p. 14 and Appendix D, pp. 342-344). Reference evapotranspiration data were used. Water content reflectometer (WCR)

probes were used to measure daily volumetric water content. The data were used to determine the *in situ* field capacity of each 30-cm soil profile and to calculate flux.

6. Run off: Run off was not studied.

7. Supplementary Study: The stability of saflufenacil and the transformation products M800H01, M800H02, M800H07, M800H08, M800H15, and M800H22, fortified to achieve a concentration of 0.10 mg/kg, and stored in a freezer for *ca.* 9 months, was determined in a separate storage stability study using the Georgia test site soil (p. 15; Gooding and Saha, 2008 (MRID 47128237), p. 9).

8. Sampling:

Table 5: Soil sampling

Details	Test site
Method of sampling (random or systematic)	Not reported[1]
Sampling intervals	-1, 0, 1, 2, 4, 6, 8, 10, 15, 20, 32, 46, 59, 75, 90, 121, 150, 182, 271, 360, and 451 days.
Method of soil collection (eg., cores)	0-15 and 15-120 cm cores
Sampling depth	120 cm
Number of cores collected per plot	15 (Five per replicate plot)
Number of segments per core	Nine (0-7.5, 7.5-15, 15-30, 30-45, 45-60, 60-75, 75-90, 90-105, and 105-120 cm)
Length of soil segments (after sectioning)	7.5 or 15 cm
Core diameter	≥10.2 cm (4 inches)
Method of sample processing, if any	Following sectioning, same-depth samples were composited by replicate plot and homogenized with dry ice in a rotary-blase type mill to produce three samples per depth at each sampling interval (one for each of the three replicate plots).
Storage conditions	Frozen
Storage length	Up to 19 months (≤574 days)

Data were obtained from p. 14 and Table 12, pp. 34-35 of the study report.
1 The study authors reported that the samples were taken from a grid block design; further details were not provided.

9. Analytical Procedures:

Number of soil samples analysed per treatment or composite sample: Three composite samples were analyzed at each sampling interval and depth for the bare treated plot (Tables 17-23, pp. 37-43 and Appendix B, Tables IV-X, pp. 83-90). Composite samples were generally analyzed once; however, selected samples were analyzed two or three times (Appendix B, pp. 109-181).

Extraction, clean up and concentration of soil samples: Soil samples (0.1 g) were extracted by shaking twice with acetonitrile followed by acetonitrile:water (40:60, v:v; p. 15; Appendix B, p. 69; Figure 1, p. 72).

Identification and quantification of parent compound: Extracts were diluted and analyzed for saflufenacil using LC/MS/MS operated in the positive ion mode (Appendix C, p. 69). Quantitation was obtained using an external calibration curve created with the saflufenacil analytical standard (Lot No.: L67-140, purity 99.9%; Appendix B, p. 66).

Identification and quantification of transformation products: Extracts were diluted and analyzed for the following transformation products using LC/MS/MS in the positive ion mode (Appendix B, pp. 67-69):

Reference standards

Applicant code	Reg. No.	Lot No.	Purity (%)	Chemical Name
M800H01	4118561	L74-62	98.8	N-[2-Chloro-4-fluoro-5-(3-methyl-2,6-dioxo-4-(trifluoromethyl)-3,6-dihydro-1(2H)-pyrimidinyl)benzoyl]-N'-isopropylsulfamide
M800H02	4118416	L67-186	99.2	N'-[2-Chloro-5-(2,6-dioxo-4-(trifluoromethyl)-3,6-dihydropyrimidin-1(2H)-yl)-4-fluorobenzoyl]-N-isopropyl-N-methylsulfamide
M800H07	4775453	L67-196	95.4	N-{4-Chloro-2-fluoro-5-[({[isopropyl(methyl)amino]-sulfonyl}amino)carbonyl]phenyl}-N'-methylurea
M800H08	4773881	L74-66	97.2	N'-[2-Chloro-4-fluoro-5-(3-methyl-2,6-dioxo-4-(trifluoromethyl)tetrahydro-1(2H)-pyrimidinyl)benzoyl]-N-isopropyl-n-methylsulfamide
M800H22	5216337	L74-56	94.1	3-[({4-Chloro-2-fluoro-5-[({[isopropyl(methyl)amino]-sulfonyl}amino)carbonyl]anilino}carbonyl)(methyl)amino]-4,4,4-trifluorobutanoic acid
M800H15	5264357	L74-80	94.5	N-{4-Chloro-2-fluoro-5-[({[isopropyl(methyl)amino]-sulfonyl}amino)carbonyl]phenyl}-4-4-4-trifluoro-3,3-dihydroxybutanamide

Chemical names were obtained from Ta, 2007 (MRID 47127825).

Quantitation was obtained using an external calibration curve created with the M800H01, M800H02, M800H07, M800H08, M800H22, and M800H15 analytical standards.

Detection limits (LOD, LOQ) for the parent compound in soil: The LOQ was 0.01 mg/kg and the LOD was 0.002 mg/kg (p. 15 and Appendix B, p. 69).

Detection limits (LOD, LOQ) for the transformation products in soil: The LOQ was 0.01 mg/kg and the LOD was 0.002 mg/kg for all analytes (p. 15 and Appendix B, p. 69).

II. RESULTS AND DISCUSSION

1. APPLICATION MONITORS: Mean recovery of saflufenacil from the Speedisk™'s placed in the test plot ranged from 79.9 to 98.2% of the theoretical, based on the target application rate (p. 18; Table 15, p. 36 and Appendix B, Table II, p. 77). Application verification spikes were prepared by fortifying nine Speedisk™'s with saflufenacil at a concentration similar to the application rate (Appendix B, p. 71). The nine spiked disks were used to create three composite spike samples.

Recoveries from the application verification spike samples ranged from 90 to 100% for the three replicate subplots.

2. RECOVERY FROM FIELD SPIKES: The overall mean recovery of saflufenacil from field spikes fortified at 2.5 µg/g and stored frozen for up to 524 days was 119% (p. 19; Table 16, p. 36 and Appendix B, Table III, pp. 80-82); recoveries were corrected for procedural recoveries.

3. MASS ACCOUNTING: A complete mass balance could not be determined because carbon dioxide and non-extractable residues were not measured; however, the study authors calculated the sum of saflufenacil and its transformation products (in parent equivalents) at each sampling interval (p. 19; Appendix C, Table 8, p. 319; Figure 6, p. 326). Following application, the total mass of observed residues was 305.06 g/ha at day 0, decreased to 147.45 g/ha by 15 days and 25.28 g/ha at 20 days, then increased to 79.11 to 89.73 g/ha from 46 to 121 days, and was not detected above the LOQ by 150 days posttreatment.

Table 6. Concentration of saflufenacil residues, expressed as ppm in soil.

Compound	Soil depth (cm)	Sampling times (days)																		
		0	1	2	4	6	8	10	15	20	32	46	59	75	90	121	150	182	271	360
Saflufenacil	0-7.5	**0.19**	**0.20**	**0.15**	**0.20**	**0.14**	**0.12**	**0.06**	**0.04**	**0.02**[1]	**0.01**[2]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	7.5-15	<0.01	**0.02**[2]	**0.01**[1]	<0.01	**0.19**	**0.03**	**0.05**	**0.04**	**0.01**[1]	<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	**0.02**	**0.01**[1]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	30-45	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.01**[1]	**0.01**[2]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	45-60	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.01**[1]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	60-75	<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	<0.01
	75-90	<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	<0.01
	90-105	<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	<0.01
	105-120	<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	<0.01
M800H01	0-7.5	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**[2]	**0.02**[2]	<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	**0.02**[1]	<0.01	**0.01**[2]	<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	<0.01
	30-45	<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	<0.01
	45-60	<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	<0.01
	60-75	<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	<0.01
	75-90	<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	<0.01
	90-105	<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	<0.01
	105-120	<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	<0.01

Compound	Soil depth (cm)	Sampling times (days)																		
		0	1	2	4	6	8	10	15	20	32	46	59	75	90	121	150	182	271	360
M800H02	0-7.5	**0.01**[1]	**0.01**[2]	**0.01**[1]	<0.01	**0.01**[1]	<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	<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	<0.01
	30-45	<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	<0.01
	45-60	<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	<0.01
	60-75	<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	<0.01
	75-90	<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	<0.01
	90-105	<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	<0.01
	105-120	<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	<0.01
M800H08	0-7.5	**0.04**	**0.02**[1]	**0.02**	<0.01	**0.03**[2]	<0.01	**0.02**	**0.02**[2]	<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	**0.05**[1]	<0.01	**0.01**[1]	**0.02**	**0.01**[1]	<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	<0.01
	30-45	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.01**[1]	**0.02**[1]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	45-60	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.01**[1]	**0.02**[2]	**0.01**	**0.01**	**0.01**	**0.02**[2]	<0.01	<0.01	<0.01	<0.01
	60-75	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.02**[2]	**0.02**	**0.02**	**0.02**	**0.02**	<0.01	<0.01	<0.01	<0.01
	75-90	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.01**[1]	<0.01	<0.01	**0.01**[1]	**0.02**[1]	<0.01	<0.01	<0.01	<0.01
	90-105	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.01**[1]	<0.01	**0.01**[1]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	105-120	<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	<0.01

Data were obtained from Tables 17-23, pp. 37-43 and Appendix B, Tables IV-X, pp. 83-89 of the study report. Concentrations are registrant-calculated means of three replicate values unless otherwise reported. Total extractable and nonextractable residues were not determined. All samples with residue concentrations below the LOQ (0.01 ppm) were reported as <0.01 ppm. As a result, the reviewer was unable to determine which, if any, samples had detections between the LOD (0.002 ppm) and the LOQ. Saflufenacil and its transformation products were not detected above the LOQ in soil samples collected prior to the test application and analyzed to a depth of 120 cm. The transformation products M800H07, M800H15, and M800H22 were not detected above the LOQ at any sampling interval or depth.
1 Single replicate detection.
2 Reviewer-calculated mean of two replicate detections.

4. PARENT COMPOUND: The mean measured zero-time concentration of saflufenacil in the 0-7.5 cm soil depth was 0.19 ppm or 57.3% of the theoretical (the percent recovery was reviewer-calculated based on a theoretical day 0 recovery of 0.331 ppm for the 0-7.5 cm soil depth; Table 17, p. 37 and Appendix B, Table IV, p. 20), and was a maximum mean of 0.20 ppm (60.4% of the theoretical) at 1 and 4 days posttreatment; the registrant-calculated day 0 recovery was 76% (p. 19). Saflufenacil decreased to 0.12 ppm by 8 days, 0.06 ppm by 10 days, 0.04 ppm by 15 days, 0.02 ppm (single replicate detection) by 20 days, and was last detected above the LOQ at 0.01 ppm (two replicate detections) at 32 days posttreatment. Saflufenacil was initially detected in the 7.5-15 cm soil depth at 0.02 ppm (mean of two replicate detections) at 1 day posttreatment, was a maximum of 0.19 ppm at 6 days (single replicate detection), decreased to 0.03-0.05 ppm by 8 to 15 days, and was last detected above the LOQ at 0.01 ppm (single replicate detection) at 20 days posttreatment. Saflufenacil was detected twice in the 15-30 cm soil depth at 0.02 ppm and 0.01 ppm (single replicate detection) at 10 and 15 days posttreatment, respectively. Saflufenacil was detected at 0.01 ppm in the 30-45 cm soil depth (single replicate detection at 20 days and mean of two replicates at 32 days) and in the 45-60 cm soil depth (single replicate detection at 32 days). Saflufenacil was not detected above the LOQ in soil below the 45-60 cm depth.

HALF-LIFE: Under field conditions in the bare soil plot, saflufenacil dissipated from the top 7.5 cm of soil with a half-life of 5.9 days ($r^2 = 0.771$); calculated by the reviewer using linear regression on replicate data following the maximum mean detection (*i.e.*, 1- to 32-day data) and assuming that concentrations less than the LOQ were one-half the LOQ (*i.e.*, 0.005 ppm). DT75 and DT90 values were 11.8 days and 19.6 days, respectively.

Registrant-calculated DT50, DT75, and DT90 values were 10.7 days, 21.4 days, and 35.5 days, respectively, using a non-linear, first order kinetic model to describe the dissipation, and based on the total mass of saflufenacil in the soil profile (r^2 for the model was 0.924; pp. 22-23; Appendix C, Table 9, p. 320; Figures 3-4, pp. 323-324). These values were confirmed by the PMRA reviewer.

5. TRANSFORMATION PRODUCTS: Detected transformation products included M800H01, M800H02, and M800H08. M800H01and M800H08 were detected in the soil at greater than or equal to 10% of the saflufenacil measured in soil at day 0.

M800H08 was detected in the 0-7.5 cm soil depth at a maximum mean concentration of 0.04 ppm (which is equal to 21.0% of the initial soil concentration of saflufenacil or 12.0% of the applied saflufenacil, based on the target application rate) at day 0, decreased to 0.02 ppm at 1 to 2 days, increased to 0.03 ppm (two replicate detections) at 6 days, then decreased to 0.02 ppm at 10 to 15 days, and was not detected above the LOQ after 15 days (Table 21, p. 41 and Appendix B, Table VIII, p. 87). M800H08 was initially detected in the 7.5-15 cm soil depth at a maximum of 0.05 ppm (single replicate detection; 15.1% of the theoretical) at 6 days, and decreased to 0.01-0.02 ppm at 10-20 days posttreatment. M800H08 was detected twice in the 30-45 cm soil depth at 0.01 ppm (single replicate detection) and 0.02 ppm (single replicate detection) at 32 and 46 days posttreatment, respectively. M800H08 was detected in the 45-60 cm soil depth at 0.01-0.02 ppm at 32 to 121 days posttreatment. M800H08 was detected in the 60-75 cm soil depth at 0.02 ppm at 46 to 121 days posttreatment. M800H08 was detected in the 75-90 cm soil depth at 0.01-0.02 ppm (single replicate detections) at 46, 90, and 121 days posttreatment. M800H08 was detected twice in

the 90-105 cm soil depth at 0.01 ppm (single replicate detections) at 46 and 75 days posttreatment, and was not detected above the LOQ in soil below the 90-105 cm depth.

M800H01 was detected in the 0-7.5 cm soil depth at a maximum mean concentration of 0.02 ppm (which is equal to 10.8% of the initial soil concentration of saflufenacil or 6.2% of the applied saflufenacil, based on the target application rate) from 0-8 days, and was not detected above the LOQ after 8 days (Table 18, p. 38 and Appendix B, Table V, p. 84). M800H01 was detected twice in the 7.5-15 cm soil depth at 0.02 ppm (single replicate detection) and 0.01 ppm (two replicate detections) at 6 and 10 days respectively, and was not detected above the LOQ in soil below the 7.5-15 cm depth.

M800H02 was detected in the 0-7.5 cm soil depth at a mean concentration of 0.01 ppm (which is equal to 5.4% of the initial soil concentration of saflufenacil or 3.1% of the applied saflufenacil, based on the target application rate) at 0-2 and 6 days, and was not detected above the LOQ after 6 days posttreatment (Table 19, p. 39 and Appendix B, Table VI, p. 85). M800H02 was not detected above the LOQ in soil below the 0-7.5 cm depth.

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

Applicants Code Name	CAS Number	Chemical Name	Chemical Formula	Molecular Weight (g/mol)	Smiles String
M800H01		N-[2-Chloro-4-fluoro-5-(3-methyl-2,6-dioxo-4-(trifluoromethyl)-3,6-dihydro-1(2H)-pyrimidinyl)benzoyl]-N'-isopropylsulfamide	$C_{16}H_{15}ClF_4N_4O_5S$	486.8	
M800H02		N'-[2-Chloro-5-(2,6-dioxo-4-(trifluoromethyl)-3,6-dihydropyrimidin-1(2H)-yl)-4-fluorobenzoyl]-N-isopropyl-N-methylsulfamide	$C_{16}H_{15}ClF_4N_4O_5S$	486.8	
M800H08		N'-[2-Chloro-4-fluoro-5-(3-methyl-2,6-dioxo-4-(trifluoromethyl)tetrahydro-1(2H)-pyrimidinyl)benzoyl]-N-isopropyl-n-methylsulfamide	$C_{17}H_{19}ClF_4N_4O_5S$	502.9	

Data were obtained from Appendix B, pp. 67-68 of the study report.
Chemical names were obtained from Ta, 2007 (MRID 47127825).

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

Table 8: Dissipation routes of saflufenacil under field conditions.

Route of dissipation	**% of applied amount (at the end of the study period)**
Accumulation (residues) in soil/ carry over	0%
Transformation (% of transformation products)	0%
Leaching, if measured	Not determined
Volatilization, if measured	Not measured
Plant uptake, if measured	Not applicable
Run off, if measured	Not measured
Total	

Saflufenacil and its transformation products were not detected at the end of the study period.

7. VOLATILIZATION: The concentration of applied saflufenacil lost through volatilization was not determined at the test site.

8. PLANT UPTAKE: Not applicable.

9. LEACHING: In the bare soil plot, residues of saflufenacil were not detected above the LOQ in soil below the 45-60 cm soil depth, and the transformation products M800H01, M800H02, and M800H08 were not detected above the LOQ in soil below the 7.5-15 cm depth, 0-7.5 cm soil depth, and the 90-105 cm soil depth, respectively (Tables 17-23, pp. 37-43 and Appendix B, Tables IV-X, pp. 83-89). The study authors did not distinguish concentrations detected above the LOD and below the LOQ from non-detects.

Changes in soil water content and flux at the 120-cm depth were calculated by the field water content domain reflectometry (WCR; p. 14). Based on the model, 12.3 cm of water were estimated to move from the 120-cm depth toward groundwater in the bare soil plot during the study period (pp. 21-22 and Appendix D, pp. 344-345; Table 2, p. 348).

10. RUN OFF: Run off was not studied at the test site.

11. RESIDUE CARRYOVER: The DT90 was 39.2 days. Saflufenacil and its transformation products were not available for carryover at the end of the study period (Tables 17-23, pp. 37-43); residues were not detected at concentrations above the LOQ after 121 days posttreatment.

12. SUPPLEMENTARY STUDY RESULTS: Storage stability results from Gooding and Saha, 2008 (MRID 47128237) indicate that saflufenacil and its transformation products were stable in soil collected from the Georgia test site and stored frozen for up to 9 months, with the exception of M800H15 (Gooding and Saha, 2008, p. 16). Recovery of saflufenacil ranged from 97 to 122%, recovery of M800H01 ranged from 90 to 122%, recovery of M800H02 ranged from 94 to 107%, recovery of M800H07 ranged from 104 to 123%, recovery of M800H08 ranged from 75 to 111%, and recovery of M800H22 ranged from 98 to 149% following 0 to 9 months of freezer storage, with no pattern of decline for any of the analytes (0-7.5 cm and 30-45 cm soil depths; Gooding and Saha,

2008, p. 16; Table IX, p. 167). Recovery of M800H15 was 99 to 121% at day 0, then decreased to 54 to 74% following 6 to 9 months of storage (0-7.5 cm and 30-45 cm soil depths).

III. STUDY DEFICIENCIES

1. M800H31 was a relatively long-lived, major degradate in the submitted aerobic soil metabolism study. Therefore, M800H31 should have been included in this field study's analysis. This deficiency does not impact the acceptability of the study.

IV. REVIEWER'S COMMENTS

1. Run off of the test compound was not studied at the test site. A run off collector at the downslope edge of the field should be used to confirm whether pesticide was lost due to run off. However, run off was not expected at this test site due to a level gradient (<1% slope) and an appreciably high percentage of sand (79%).

2. The stability of the transformation products of saflufenacil in the test site soils was demonstrated under typical laboratory storage conditions. Test samples and field spikes in the field dissipation study were stored frozen for up to 19 and 17.5 months (*i.e.*, ≤574 days), respectively, prior to analysis. A separate laboratory freezer storage stability study was conducted using soil collected from the test sites, fortified with the parent and its transformation products, and stored frozen for a maximum of 18.5 months (*i.e.*, 560 days) (Gooding and Saha, 2008; MRID 47560309). The storage stability study is considered sufficient to describe the frozen storage stability of the test samples, although it was terminated approximately two weeks less than the maximum duration of test sample storage, because an additional 14 days of storage is not expected to yield different results after 560 days. Results indicate that saflufenacil and its transformation products were stable in all three test soils, with the exception of M800H15.

3. The study authors reported all residues of saflufenacil and the transformation products M800H01, M800H02, M800H07, M800H08, M800H15, and M800H22 in terms of the LOQ (0.01 ppm), rather than differentiating residues in terms of being below the LOQ but above the LOD (0.002 ppm), or below the LOD (Tables 17-23, pp. 37-43; Appendix B, Tables IV-X, pp. 83-89). Residues below the LOQ should be reported as "<LOQ" ("<0.01 ppm"), and residues below the LOD should be reported as "not detected" or "<LOD" ("<0.002 ppm") to allow the reviewer to determine which samples contained residues of the parent and transformation products that were not quantifiable, and which samples did not contain residues.

4. The maximum concentration of M800H01, M800H02, and M800H08 in soil was converted to parent equivalents by the reviewer by dividing the concentration of the transformation product by the molecular weight conversion factor (0.97 for M800H01 and M800H02 and 1.00 for M800H08). The molecular weight conversion factor was calculated by dividing the molecular weight of M800H01 and M800H02 (486.8 g/mol) and M800H08 (502.9 g/mol) by the molecular weight of the parent (500.9 g/mol). The percent of M800H01, M800H02, and

M800H08 in terms of percent of the applied saflufenacil was calculated by dividing the concentration of the transformation products in parent equivalents by the theoretical day 0 concentration of saflufenacil in the 0-7.5 cm soil depth based on one application at the target application rate.

5. The study authors stated that, based on a review of the laboratory studies, saflufenacil would be expected to degrade predominantly through aerobic soil processes in the field to the transformation products M800H01, M800H02, M800H07, M800H08, and M800H22 (pp. 16-18). In a laboratory aerobic soil metabolism study, saflufenacil degraded with a non-linear half-life of 9.3-32 days; $^{14}CO_2$ accounted for up to 15% following 334 days and an additional 15-35% of the radioactivity was associated with unextracted residues (Singh, 2007; MRID 47127826).

6. Concurrent recoveries were determined by fortifying control soil samples with saflufenacil and the transformation products M800H01, M800H02, M800H07, M800H08, M800H15, and M800H22 at 0.01, 0.1, and 0.5 ppm (p. 18 and Appendix B, p. 71). Mean recoveries (± standard deviation) were 96 ± 11% for saflufenacil, 95 ± 10% for M800H01, 97 ± 9% for M800H02, 103 ± 18% for M800H07, 98 ± 16% for M800H08, 89 ± 12% for M800H15, and 96 ± 19% for M800H22; recoveries were similar across all fortification levels (Table 14, p. 36; Appendix B, Table I, p. 76 and Appendix B, pp. 95-107).

7. Residues of M800H08 in soil samples were corrected to account for the contribution of the chlorine isotope ^{37}Cl from saflufenacil (Appendix B, pp. 69-70). The correction was applied only for the quantitation of the treated samples and only to samples that contained residues at or above the LOD. The correction was not applied to the procedural fortification samples.

8. Fomesafen sodium salt, which has structural similarities to saflufenacil, was broadcast on site during the study. However, fomesafen does not degrade into the detected transformation products of saflufenacil, M800H01, M800H02, and M800H08. Therefore, use of fomesafen should not have impacted the study results.

V. REFERENCES

1. U.S. Environmental Protection Agency. 1982. Pesticide Assessment Guidelines, Subdivision N, Chemistry: Environmental Fate, Section 164-1, Terrestrial Field Dissipation Studies. Office of Pesticide and Toxic Substances, Washington, DC. EPA 540/9-82-021.

2. U.S. Environmental Protection Agency. 1993. Pesticide Registration Rejection Rate Analysis - Environmental Fate. Office of the Prevention, Pesticides, and Toxic Substances, Washington, DC. EPA 738-R-93-010.

3. U.S. Environmental Protection Agency. 1989. FIFRA Accelerated Reregistration, Phase 3 Technical Guidance. Office of the Prevention, Pesticides, and Toxic Substances, Washington, DC. EPA 540/09-90-078.

4. Ta, C. 2007. BAS 800 H: Soil photolysis. Unpublished study performed, submitted, and sponsored by BASF Corporation, Research Triangle Park, North Carolina. BASF Doc ID: 2007/7007647. Study Protocol ID: 132653.

5. Gooding, R. and M. Saha. 2008. Freezer storage stability of BAS 800 H and the relevant metabolites in soil samples. Unpublished study performed by BASF Agro Research, Research Triangle Park, North Carolina; sponsored and submitted by BASF Corporation, Research Triangle Park, North Carolina. BASF Study No.: 132671. BASF Registration Document No.: 2007/7013581.

6. Singh, M. 2007. Aerobic soil metabolism of ^{14}C-BAS 800 H on US soils. Unpublished study performed by BASF Agro Research, Research, Triangle Park, North Carolina and sponsored and submitted by BASF Corporation, Research Triangle Park, North Carolina. Study Protocol ID.: 132650.

Attachment 1: Structures of Parent Compound and Transformation Products

Saflufenacil [BAS 800 H, CL No. 433379, 4054449, AC 433,379]

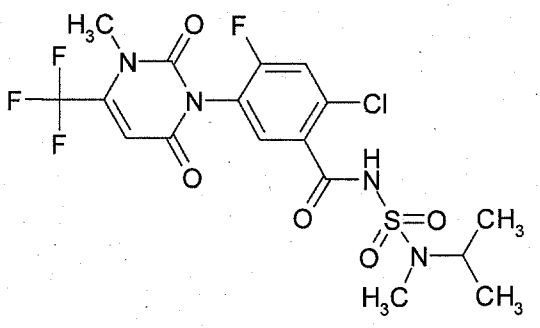
IUPAC Name: N′-{2-Chloro-4-fluoro-5-[1,2,3,6-tetrahydro-3-methyl-2,6-dioxo-4-(trifluoromethyl)pyrimidin-1-yl]benzoyl}-N-isopropyl-N-methylsulfamide. N'-[2-Chloro-4-fluoro-5-(3-methyl-2,6-dioxo-4-(trifluoromethyl)-3,6-dihydro-1(2H)-pyrimidinyl)benzoyl]-N-isopropyl-N-methylsulfamide.

CAS Name: 2-Chloro-5-[3,6-dihydro-3-methyl-2,6-dioxo-4-(trifluoromethyl)-1(2H)-pyrimidinyl]-4-fluoro-N-[[methyl(1-methylethyl)amino]sulfonyl]benzamide.

CAS Number: 372137-35-4.

SMILES String: N1(C)C(C(F)(F)F)=CC(=O)N(C2=CC(C(=O)NS(=O)(=O)N(C)C(C)C)=C(Cl)C=C2F)C1=O (EPI Suite v3.12 SMILES string from ISIS .MOL).

Empirical formula: $C_{17}H_{17}ClF_4N_4O_5S$ **Molecular formula:** $C_{17}H_{17}ClF_4N_4O_5S$



Identified Compounds

Saflufenacil [BAS 800 H, CL No. 433379, 4054449, AC 433,379]

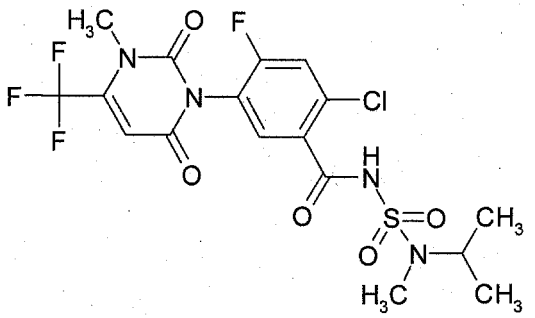
IUPAC Name: N′-{2-Chloro-4-fluoro-5-[1,2,3,6-tetrahydro-3-methyl-2,6-dioxo-4-(trifluoromethyl)pyrimidin-1-yl]benzoyl}-N-isopropyl-N-methylsulfamide. N'-[2-Chloro-4-fluoro-5-(3-methyl-2,6-dioxo-4-(trifluoromethyl)-3,6-dihydro-1(2H)-pyrimidinyl)benzoyl]-N-isopropyl-N-methylsulfamide.

CAS Name: 2-Chloro-5-[3,6-dihydro-3-methyl-2,6-dioxo-4-(trifluoromethyl)-1(2H)-pyrimidinyl]-4-fluoro-N-[[methyl(1-methylethyl)amino]sulfonyl]benzamide.

CAS Number: 372137-35-4.

SMILES String: N1(C)C(C(F)(F)F)=CC(=O)N(C2=CC(C(=O)NS(=O)(=O)N(C)C(C)C)=C(Cl)C=C2F)C1=O (EPI Suite v3.12 SMILES string from ISIS .MOL).

Empirical formula: $C_{17}H_{17}ClF_4N_4O_5S$ **Molecular formula:** $C_{17}H_{17}ClF_4N_4O_5S$

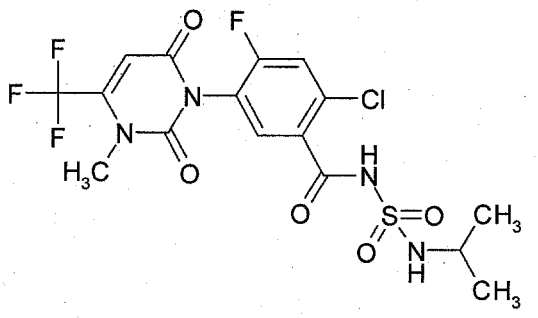


M800H01 [4118561]

IUPAC Name: N'-[2-Chloro-4-fluoro-5-(3-methyl-2,6-dioxo-4-(trifluoromethyl)-3,6-dihydro-1(2H)-pyrimidinyl)benzoyl]-N'-isopropylsulfamide.

CAS Name: Not reported.

CAS Number: Not reported.

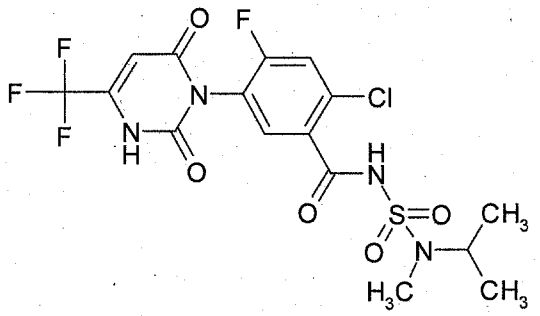


M800H02 [4118416]

IUPAC Name: N'-[2-Chloro-5-(2,6-dioxo-4-(trifluoromethyl)-3,6-dihydropyrimidin-1(2H)-yl)-4-fluorobenzoyl]-N-isopropyl-N-methylsulfamide.
N'-[2-Chloro-5-(2,6-dioxo-4-(trifluoromethyl)-3,6-dihydro-1(2H)-pyrimidinyl)-4-fluorobenzoyl]-N-isopropyl-N-methylsulfamide.

CAS Name: Not reported.

CAS Number: Not reported.

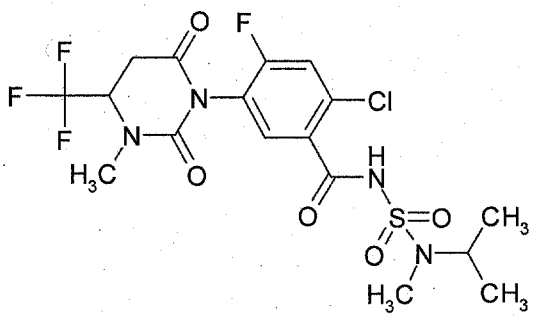


M800H08 [4773881]

IUPAC Name: N'-[2-Chloro-4-fluoro-5-(3-methyl-2,6-dioxo-4-(trifluoromethyl)tetrahydro-1(2H)-pyrimidinyl)benzoyl]-N-isopropyl-N-methylsulfamide.

CAS Name: Not reported.

CAS Number: Not reported.



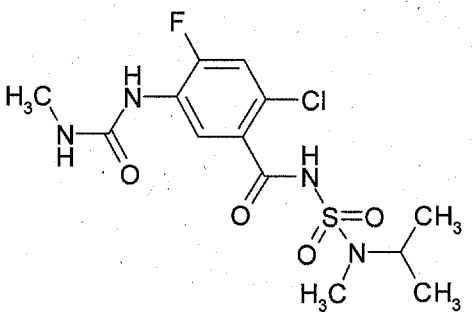
Unidentified Reference Compounds

M800H07 [4775453]

IUPAC Name: N-{4-Chloro-2-fluoro-5-[({[isopropyl(methyl)amino]sulfonyl}amino)carbonyl]phenyl}-N'-methylurea.

CAS Name: Not reported.

CAS Number: Not reported.

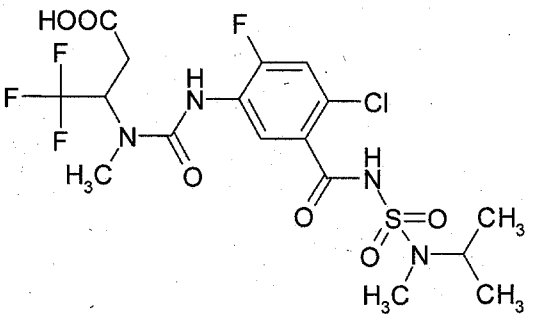


M800H22 [5216337]

IUPAC Name: 3-[({4-Chloro-2-fluoro-5-[({[isopropyl(methyl)amino]sulfonyl}amino)carbonyl]anilino}carbonyl)(methyl)amino]-4,4,4-trifluorobutanoic acid.

CAS Name: Not reported.

CAS Number: Not reported.

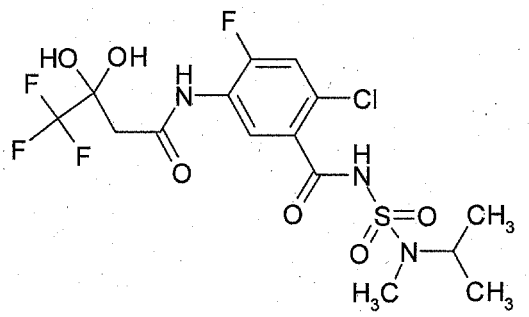


M800H15 [M800H15–ketohydrate, "Ketohydrate", 5264357]

IUPAC Name: N-{4-Chloro-2-fluoro-5-[({[isopropyl(methyl)amino]sulfonyl}amino)carbonyl]phenyl}-4-4-4-trifluoro-3,3-dihydroxybutanamide.

CAS Name: Not reported.

CAS Number: Not reported.



Attachment 2: Excel Spreadsheets

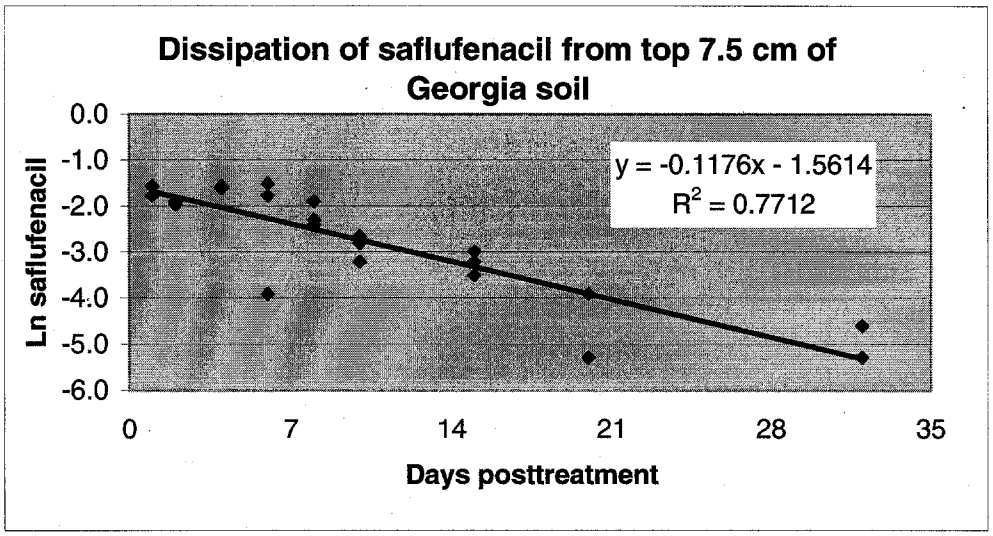
Chemical name	Saflufenacil	Bare plot
PC code	118203	0-7.5 cm depth
MRID	47128234	
Guideline No.	835.6100	

Linear		Non-linear	
DT50 (d) =	**5.9**	DT50 (d) =	**6.9**
DT75 (d) =	**11.8**	DT75 (d) =	**13.7**
DT90 (d) =	**19.6**	DT90 (d) =	**22.8**

***Calculated using all replicate data following the maximum mean detection (1- to 32-day data); values <LOQ are assumed 1/2 LOQ.**

Days posttreatment	Sample replicate	Saflufenacil (ppm)	Ln	Est.	SE	Y^2
1	A	0.21	-1.561	0.201868	6.61299E-05	0.0441
1	B	0.21	-1.561	0.201868	6.61299E-05	0.0441
1	C	0.17	-1.772	0.201868	0.001015567	0.0289
2	A	0.14	-1.966	0.182493	0.001805688	0.0196
2	B	0.14	-1.966	0.182493	0.001805688	0.0196
2	C	0.15	-1.897	0.182493	0.00105582	0.0225
4	A	0.2	-1.609	0.149144	0.002586305	0.04
4	B	0.2	-1.609	0.149144	0.002586305	0.04
4	C	0.21	-1.561	0.149144	0.00370342	0.0441
6	A	0.22	-1.514	0.121889	0.009625686	0.0484
6	B	0.17	-1.772	0.121889	0.002314628	0.0289
6	C	0.02	-3.912	0.121889	0.010381454	0.0004
8	A	0.09	-2.408	0.099615	9.24514E-05	0.0081
8	B	0.1	-2.303	0.099615	1.48099E-07	0.01
8	C	0.15	-1.897	0.099615	0.002538632	0.0225
10	A	0.04	-3.219	0.081411	0.001714899	0.0016
10	B	0.06	-2.813	0.081411	0.000458445	0.0036
10	C	0.07	-2.659	0.081411	0.000130219	0.0049
15	A	0.04	-3.219	0.049157	8.38468E-05	0.0016
15	B	0.05	-2.996	0.049157	7.11006E-07	0.0025
15	C	0.03	-3.507	0.049157	0.000366983	0.0009
20	A	0.02	-3.912	0.029681	9.37265E-05	0.0004
20	B	0.005	-5.298	0.029681	0.000609164	0.000025
20	C	0.005	-5.298	0.029681	0.000609164	0.000025
32	A	0.005	-5.298	0.008844	1.47748E-05	0.000025
32	B	0.01	-4.605	0.008844	1.33681E-06	0.0001
32	C	0.01	-4.605	0.008844	1.33681E-06	0.0001

* Data obtained from Table 17, p. 37 and Appendix B, Table IV, p. 83 of the study report.



Chemical name	Saflufenacil	Bare plot
PC code	118203	0-7.5 cm depth
MRID	47128234	
Guideline No.	835.6100	

C0	0.22329947
k	0.10089992
t 1/2	6.86965031
SSE	0.04372866
R^2	0.72998976

ANOVA

Source	Df	SS	MS	F	p
Reg	1	0.118223193	0.118223	67.58908	1.4238E-08
Error	25	0.043728658	0.001749		
Total	26.00	0.161951852			

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.87820338
R Square	0.77124118
Adjusted R Square	0.76209083
Standard Error	0.62878358
Observations	27

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	33.32381788	33.32382	84.2854	1.74824E-09
Residual	25	9.884219646	0.395369		
Total	26	43.20803753			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-1.5613705	0.18467682	-8.45461	8.45E-09	-1.941719504	-1.1810215	-1.9417195	-1.1810215
X Variable 1	-0.1176221	0.012811879	-9.180708	1.75E-09	-0.144008685	-0.0912356	-0.14400869	-0.0912356

Chemical name	Saflufenacil
PC code	118203
MRID	47128234
Guideline No.	835.6100

Spreadsheet to convert application rate from lbs a.i./Acre to to mg a.i./kg (ppm)

Bare plot

See study for values to input	Application rate:	0.357	lbs a.i./Ac
	Depth of plow layer:	7.5	cm
	Bulk density for specified plow layer reported above:	1.61	g/cm^3
Automatically calculated by spreadsheet	Application rate converted to mg/kg:	0.331	mg a.i./Kg (ppm)
	Application rate converted to kg a.i./ha	0.40	kg a.i./ha

Calculation for saflufenacil as the percent of the day 0 theoretical:

Bare plot (0-7.5cm)

Saflufenacil			
Concentration (ppm)		Percent of day 0 theoretical	
day 0	days 1 and 4	day 0	days 1 and 4
0.19	0.2	57.3%	60.4%

From Table 17, p. 37 and Appendix B, Table IV, p. 83 of the study report.

Chemical name	Saflufenacil
PC code	118203
MRID	47128234
Guideline No.	835.6100

Calculation for the maximum concentration of transformation products as percent of the total applied saflufenacil:

0-7.5 cm depth

Maximum concentration of M800H01 in the bare plot (ppm) =	0.02	at 0-8 days
Maximum concentration of M800H02 in the bare plot (ppm) =	0.01	at 0-2, 6 days
Maximum concentration of M800H08 in the bare plot (ppm) =	0.04	at 0 days

From Tables 18-23, pp. 38-43 and Appendix B, Tables V-X, pp. 84-89 of the study report.

Molecular weight of saflufenacil (g/mol) =	500.9
Molecular weight of M800H01 (g/mol) =	486.8
Molecular weight conversion factor =	0.97

Maximum concentration of M800H01 as percent of the total applied saflufenacil, bare plot =	6.2%
Maximum concentration of M800H01 as percent of the initial concentration of saflufenacil, bare plot =	10.8%

Molecular weight of saflufenacil (g/mol) =	500.9
Molecular weight of M800H02 (g/mol) =	486.8
Molecular weight conversion factor =	0.97

Maximum concentration of M800H02 as percent of the total applied saflufenacil, bare plot =	3.1%
Maximum concentration of M800H02 as percent of the initial concentration of saflufenacil, bare plot =	5.4%

Molecular weight of saflufenacil (g/mol) =	500.9
Molecular weight of M800H08 (g/mol) =	502.9
Molecular weight conversion factor =	1.00

Maximum concentration of M800H08 as percent of the total applied saflufenacil, bare plot =	12.0%
Maximum concentration of M800H08 as percent of the initial concentration of saflufenacil, bare plot =	21.0%

Chemical name	Saflufenacil
PC code	118203
MRID	47128234
Guideline No.	835.6100

Maximum interval between irrigation.

10-Nov-05
30-Jan-06
81

Data obtained from Appendix D, pp. 370-375 of the study report.
*Data from October 2005-October 2006. Daily irrigation data was not reported from November 2006-January 2007. Maximum interval between irrigation could not be determined after October 2006.