

BAS 510 F
Foliage of Legume Vegetables
PMRA a.i. code (CCH)

Field Accumulation in Rotational Crops
OPPTS 860.1900
DACO 7.4.4

PC Code: 128008
MRIDs: 45623409, 45623412
Submission #2001-1027, 1036, 1043



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PREVENTION, PESTICIDES
AND TOXIC SUBSTANCES

MEMORANDUM

Date: July 2, 2003

Reviewers:

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DP Barcode: D281841 and D297173

Petition No.: 1F06313

Citation: 45623409 Versoi, P.; Abdel-Baky, S. (2002) Magnitude of the Residue of BAS 510F In Peas and Beans Planted As Rotational Crops and of BAS 500F in Peas and Beans When Applied as a Foliar Spray: Lab Project Number: 2001/5003311. Unpublished study prepared by BASF Corporation. 118 p.

45623412 Jordan, J. (2002) Cereal Grains and Soybean Field Rotational Crop Study For BAS 510 F: Lab Project Number: 2002/5001341. Unpublished study prepared by BASF Corporation. 231 p.

Sponsor: BASF Corporation

Background

The information contained herein was compiled by Dynamac Corporation (20440 Century Boulevard, Suite 100, Germantown MD 20874), contractor, under the supervision of RAB2/HED. This DER has undergone secondary review by RAB2, and reflects current HED and Office of Pesticide Programs (OPP) policies. This DER has also been peer-reviewed by PMRA/Canada.

Executive Summary

BASF Corporation has submitted the results of extended field rotational crop studies conducted on the representative crops, bean, forage and hay (MRID 45623409), field pea, vines and hay (MRID 45623409), and soybean forage and hay (MRID 45623412) of the Foliage of Legume Vegetables Group (Crop Group 7). Three trials were conducted in Regions 2 (1 trial; NC), 4 (1 trial; AR), 6 (1 trial; OK) on bean (cowpea); three trials were conducted in Region 11 (WA, OR, and ID) on field pea; and fifteen trials were conducted in Regions 2 (2 trials; GA and NC), 4 (2 trials; AR), and 5 (11 trials; IA, IL, ND, and NE) on soybeans as rotational crops. Geographical representation of data is adequate for the establishment of a tolerance for inadvertent residues on the Foliage of Legume Vegetables Group (Crop Group 7) as specified by OPPTS GLN 860.1900 and 1500 (Table 2). [It is noted that data for extended field rotational crop studies on cereal grains and soybean seed were included in MRID 45623412; these data are presented in the 860.1900 DERs for cereal grains and soybean seed.]

At each field trial, three sequential applications of the 70% wettable granule (WG) formulation were made to the bare soil surface. The first application was made at ~0.72 lb ai/A (~0.81 kg ai/ha) followed by two applications at ~0.55 lb ai/A/application (~0.62 kg ai/ha/application), with 6- to 8-day retreatment intervals, for a total rate of 1.81-1.86 lb ai/A (2.03-2.08 kg ai/ha). The rotational crops, beans (cowpeas), field peas, and soybeans, were planted 13-15 days following the last application of the test formulation to the soil. The rotational crops were allowed to grow and mature according to good agricultural practices. Samples of bean forage and hay, field pea vines and hay, and soybean forage and hay were collected at appropriate sampling interval or at normal maturity. [Soybean seed samples were also collected; refer to the soybean seed 860.1900 DER for MRID 45623412 for these data.] Samples were analyzed for residues of BAS 510 F using LC/MS/MS Method D9908. Concurrent method recovery data indicate that the LC/MS/MS method is valid for data collection.

In rotational crops planted 13-15 days following the last application to bare soil, residues of BAS 510 F ranged <0.05-1.05 ppm in bean (cowpea) forage, <0.05-1.50 ppm in bean hay, <0.05 ppm in pea vines, <0.05-0.15 ppm in pea hay, <0.05-0.202 ppm in soybean forage, and <0.05-0.540 ppm in soybean hay. It is noted that there is a 10x difference between the maximum residue reported in pea hay (0.15 ppm) versus bean hay (1.50 ppm).

Based on the submitted data, HED concludes that inadvertent residues of BAS 510 F are expected in/on representative commodities of Crop Group 7 at plantback intervals of 13-15 days. HED will rely on the maximum residue of representative commodities of Crop Group 7 when making a recommendation for appropriate tolerance levels.

GLP Compliance

Signed and dated GLP, Quality Assurance, and Data Confidentiality statements were provided. No GLP deviations were reported which would impact the study results or their interpretation.

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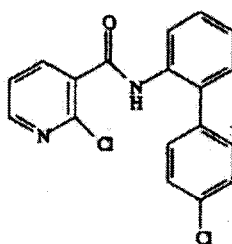
PC Code: 128008
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1. Materials and Methods

1.1. Test Substance

Active Ingredient

Common Name: Nicobifen (ISO, proposed)
IUPAC Name: 2-Chloro-N-(4'-chlorobiphenyl-2-yl)nicotinamide
CAS Name: 3-Pyridinecarboxamide, 2-chloro-N-(4'chloro[1,1'-biphenyl]-2-yl)-
CAS Number: 188425-85-6
Company Name: BAS 510 F
Other Synonyms: BASF Registry No. 300355
Structure:



1.2. Trial Information

Table 1.2.1. Summary of Rotational Crop Trial Numbers and Geographic Location.														
Foliage of legume vegetables ¹	Growing Region													Total Number of Trials
	1	2	3	4	5	6	7	8	9	10	11	12	13	
Bean (cowpea)														
Submitted	-	1	-	1	-	1	-	-	-	-	-	-	-	3
Requested	-	-	-	-	-	-	-	-	-	-	-	-	-	3 ²
Pea, field														
Submitted	-	-	-	-	-	-	-	-	-	-	3	-	-	3
Requested	-	-	-	-	-	-	-	-	-	-	-	-	-	3 ²
Soybean														
Submitted	-	2	-	2	11	-	-	-	-	-	-	-	-	15
Requested	-	2	-	2	11	-	-	-	-	-	-	-	-	15

¹ The representative commodities for the foliage of legume vegetables crop group are bean, field pea (*Pisum* spp.) and soybean.

² Field trial locations are not specified for crops requiring ≤3 trials.

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Table 1.2.2. Rotational Crop Trial Information

Location (County, State, Year)	EPA Region	Formulation	Applic. Rate (lb ai/A) ¹ [kg ai/ha]	Tank Mix Adjuvants	Rotated Crop; Variety	PBI (days)	Harvest Procedures	
							matrix	DAP ²
Bean (cowpea)								
Wake, NC, 2001	2	70% WG	0.72 + 0.55 + 0.55 = 1.82 [2.04]	None	Beans (cowpeas); Red Ripper	14	forage	35, 42, 49
							hay	53, 60, 68
Crittenden, AR, 2001	4	70% WG	0.72 + 0.55 + 0.55 = 1.82 [2.04]	None	Beans (cowpeas); Knuckle Purplehull	14	forage	31, 41, 48
							hay	65, 72, 79
Caddo, OK, 2001	6	70% WG	0.72 + 0.55 + 0.55 = 1.82 [2.04]	Latron B-1956	Bean (cowpeas); Pinkeye Bur	14	forage	30, 37, 44
							hay	49, 56, 63
Pea, field								
Grant, WA, 2001	11	70% WG	0.72 + 0.55 + 0.55 = 1.82 [2.04]	None	Peas, field, dry; Case Load	14	vine	46, 53, 60
							hay	46, 53, 60
Jefferson, OR, 2001	11	70% WG	0.73 + 0.55 + 0.55 = 1.83 [2.05]	Agri-Dex COC (1 st application only)	Peas, dry, field; Maples	13	vine	75, 82, 89
							hay	75, 82, 89
Payette, ID, 2001	11	70% WG	0.73 + 0.57 + 0.56 = 1.86 [2.08]	None	Peas, field, dry; Austrian Winter	13	vine	78, 84, 92
							hay	78, 84, 92
Soybean								
Wake, NC, 2001	2	70% WG	0.73 + 0.539 + 0.549 = 1.818 [2.04]	None	Soybean; DP 6880RR	13	forage	49
							hay	60
Tift, GA, 2001	2	70% WG	0.724 + 0.552 + 0.548 = 1.824 [2.04]	None	Soybean; Cobb	14	forage	57

Table 1.2.2. Rotational Crop Trial Information

Location (County, State, Year)	EPA Region	Formulation	Applic. Rate (lb a/A) ¹ [kg a/ha]	Tank Mix Adjuvants	Rotated Crop; Variety	PBI (days)	Harvest Procedures	
							matrix	DAP ²
Crittendon, AR, 2001	4	70% WG	0.72 + 0.55 + 0.55 = 1.82 [2.04]	None	Soybean; Pioneer 95B95	14	forage	36
							hay	57
St. Francis, AR, 2001	4	70% WG	0.72 + 0.55 + 0.55 = 1.82 [2.04]	None	Soybean; Pioneer 95B95	14	forage	49
							hay	60
Clinton, IL, 2001	5	70% WG	0.727 + 0.54 + 0.5478 = 1.8148 [2.03]	None	Soybean; Ashgrow 4301	14	forage	42
							hay	60
Clinton, IL, 2001	5	70% WG	0.7248 + 0.55 + 0.55 = 1.8248 [2.04]	None	Soybean; Ashgrow 4301	14	forage	42
							hay	60
Stark, IL, 2001	5	70% WG	0.726 + 0.55 + 0.56 = 1.836 [2.06]	None	Soybean; Stine S3293-4	14	forage	36
							hay	55
Stark, IL, 2001	5	70% WG	0.733 + 0.55 + 0.559 = 1.842 [2.06]	None	Soybean; Stine S3293-4	14	forage	36
							hay	51
Jefferson, IA, 2001	5	70% WG	0.738 + 0.556 + 0.53 = 1.824 [2.04]	None	Soybean; Golden Harvest H3005	13	forage	27
							hay	41
Wapello, IA, 2001	5	70% WG	0.733 + 0.549 + 0.53 = 1.812 [2.03]	None	Soybean; Golden Harvest H3005	13	forage	27
							hay	41
Keokuk, IA, 2001	5	70% WG	0.738 + 0.544 + 0.56 = 1.842 [2.06]	None	Soybean; Golden Harvest H3005	13	forage	27
							hay	41
Cass, ND, 2001	5	70% WG	0.73 + 0.55 + 0.555 = 1.835 [2.06]	None	Soybean; Corona	13	forage	40
							hay	47

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Table 1.2.2. Rotational Crop Trial Information								
Location (County, State, Year)	EPA Region	Formulation	Applic. Rate (lb ai/A) ¹ [kg ai/ha]	Tank Mix Adjuvants	Rotated Crop; Variety	PBI (days)	Harvest Procedures	
							matrix	DAP ²
Cass, ND, 2001	5	70% WG	0.74 + 0.56 + 0.552 = 1.852 [2.07]	None	Soybean; Corona	13	forage	40
							hay	47
York, NE, 2001	5	70% WG	0.722 + 0.546 + 0.553 = 1.821 [2.04]	None	Soybean; NE 1900	15	forage	27
							hay	46
Hall, NE, 2001	5	70% WG	0.722 + 0.55 + 0.553 = 1.825 [2.04]	None	Soybean; NE 1900	14	forage	27
							hay	49

¹ Three broadcast applications were made directly to the soil, with 6- to 8-day retreatment intervals. Applications were made using ground equipment in 10-30 gal/A water and in some cases with a spray adjuvant added.

² Represents the number of days after planting (DAP) rotational crop samples were harvested; bean and pea foliage were harvested at three sampling intervals.

A single untreated and duplicate treated samples of the rotational crops from the 13- to 15-day plant-back interval (PBI) were collected at normal maturity. Bean and pea foliage samples were collected at three sampling intervals. The petitioner indicated that pea and bean plants cut for hay were allowed to dry in the field for 2-7 days before collection. Sampling procedures were not specified, but minimum sample weights were 2.2 lb (1 kg) for bean forage and pea vines and 1.1 lb (0.5 kg) for bean and pea hay.

Soybean forage samples were collected from plants at least 6-8 inches tall (sixth node) and prior to pod formation; each sample weighed ~ 2.2 lbs (1 kg). Hay samples were cut when the plants were between the mid- to full-bloom stage and pods were no more than 50% developed. Hay samples were field dried to a moisture content of 10-20% and each sample weighed ~ 1.1 lbs (\approx 1 kg).

1.3. Post-harvest Procedures

Samples of bean forage, pea vines, and soybean forage were frozen (temperature not specified) on the day of harvest. Samples of bean and pea hay were allowed to dry in the field for 2-7 days and samples of soybean hay were field dried (number of days not specified) to a moisture content of 10-20% and then the dried hay samples were frozen. Samples were shipped frozen or packed in coolers with blue ice to BASF (Research Triangle Park, NC) for analysis. Samples were analyzed within 0-5 days of extraction.

Table 1.3.1. Summary of Storage Conditions at Analytical Facility			
Matrix	RAC or Extract	Storage Temperature (°C)	Duration
Bean	Forage	<-10	99-119 days (3.3-3.9 months)
	Hay		88-119 days (2.9-3.9 months)
Pea	Vine	<-10	44-97 days (1.4-3.2 months)
	Hay		45-101 days (1.5-3.3 months)
Soybean	Forage	<-10	25-108 days (0.8-3.6 months)
	Hay		41-139 days (1.3-4.6 months)

1.4. Analytical Methods

Samples of rotational crop commodities were analyzed for residues of BAS 510 F using LC/MS/MS method D9908, the data collection method for plants. Briefly, samples were extracted with methanol:water:HCl (70:25:5, v:v:v) and filtered. An aliquot of the filtrate was cleaned up using liquid:liquid partitioning with saturated NaCl and cyclohexane. An aliquot of the cyclohexane phase was collected and, if necessary, subjected to further cleanup through a silica gel micro-column; residues were eluted with ethyl acetate in DCM. The cyclohexane aliquot or eluate following silica gel cleanup was then evaporated to dryness and residues were redissolved in methanol:4 mM ammonium formate and 0.1% formic acid buffer solution (8:2, v:v) for analysis by LC/MS/MS; refer to the DER for MRID 45405027 for a complete description

of the quantitation procedures. The limit of detection (LOD) was 0.025 ppm, and the validated limit of quantitation (LOQ) was <0.05 ppm for residues of BAS 510 F in/on all rotated crop commodities. Concurrent recovery results are presented in Table 2.1 below.

2. Results

Table 2.1. Summary of Concurrent Analytical Method Validation.

Crop Matrix	Fortification Level (ppm)	Recoveries (%)	Mean Recovery \pm SD
Bean, forage	1.00, 30.0	82, 108	95
Bean, hay	0.05-20.0	64, 86, 95	82 \pm 16
Pea, vine	0.05, 1.0	103, 104	104
Pea, hay	0.05-5.00	80, 104, 112	99 \pm 17
Soybean, forage	0.05, 1.00	82, 91, 94, 94, 96, 98	93 \pm 6
Soybean, hay	0.05, 1.00	79, 86, 88, 92, 92, 93	88 \pm 5

Table 2.2. Residue Data from Rotational Crop Trials with BAS 510 F, 70% WG formulation, Applied to the Soil for a Total Rate of 1.81-1.86 lb ai/A.

Table 2.2. Residue Data from Rotational Crop Trials with BAS 510 F, 70% WG formulation, Applied to the Soil for a Total Rate of 1.81-1.86 lb ai/A.					
Location (County, State, Year)	Crop; Variety	Commodity	Plant-Back Interval (days)	Days after Planting (DAP) ¹	BAS 510 F Residues (ppm)
Bean (cowpea)					
Wake, NC, 2001	Beans (cowpeas); Red Ripper	forage	14	35	<0.05, 0.05
				42	<0.05, <0.05
				49	<0.05, <0.05
		hay		53	<0.05, <0.05
				60	<0.05, <0.05
				68	<0.05, <0.05
Crittenden, AR, 2001	Beans (cowpeas); Knuckle Purplehull	forage	14	31	<0.05, <0.05
				41	<0.05, <0.05
				48	<0.05, <0.05
		hay		65	0.16, 0.17
				72	0.18, 0.30
				79	0.28, 0.28
Caddo, OK, 2001	Bean (cowpeas); Pinkeye Bur	forage	14	30	0.99, 1.05
				37	0.48, 0.49
				44	0.33, 0.33
		hay		49	0.62, 0.72
				56	0.47, 0.58
				63	0.49, 1.50

Location (County, State, Year)	Crop; Variety	Commodity	Plant-Back Interval (days)	Days after Planting (DAP) ¹	BAS 510 F Residues (ppm)
Pea, field					
Grant, WA, 2001	Peas, field, dry; Case Load	vines	14	46	<0.05, <0.05
				53	<0.05, <0.05
				60	<0.05, <0.05
		hay		46	0.08, 0.09
				53	0.06, 0.07
				60	0.09, 0.09
Jefferson, OR, 2001	Peas, dry, field; Maples	vines	13	75	<0.05, <0.05
				82	<0.05, <0.05
				89	<0.05, <0.05
		hay		75	0.11, 0.11
				82	0.14, 0.15
				89	0.09, 0.09
Payette, ID, 2001	Peas, field, dry; Austrian Winter	vines	13	78	<0.05, <0.05
				84	<0.05, <0.05
				92	<0.05, <0.05
		hay		78	0.09, 0.11
				84	0.07, 0.09
				92	<0.05, <0.05
Soybean					
Wake, NC, 2001	Soybean; DP 6880RR	forage	13	49	0.124, 0.128
		hay		60	0.368, 0.540
Tift, GA, 2001	Soybean; Cobb	forage	14	57	0.164, 0.202
Crittendon, AR, 2001	Soybean; Pioneer 95B95	forage	14	36	0.062, 0.094
		hay		57	0.147, 0.214
St. Francis, AR, 2001	Soybean; Pioneer 95B95	forage	14	49	<0.05, <0.05
		hay		60	0.188, 0.240
Clinton, IL, 2001	Soybean; Ashgrow 4301	forage	14	42	0.064, 0.066
		hay		60	0.136, 0.146
Clinton, IL, 2001	Soybean; Ashgrow 4301	forage	14	42	0.052, 0.102
		hay		60	<0.05, 0.215
Stark, IL, 2001	Soybean; Stine S3293-4	forage	14	36	0.086, 0.132
		hay		55	0.068, 0.076
Stark, IL, 2001	Soybean; Stine S3293-4	forage	14	36	0.05, 0.052
		hay		51	0.082, 0.128

Location (County, State, Year)	Crop; Variety	Commodity	Plant-Back Interval (days)	Days after Planting (DAP) ¹	BAS 510 F Residues (ppm)
Jefferson, IA, 2001	Soybean; Golden Harvest H3005	forage	13	27	0.056, 0.067
		hay		41	0.078, 0.128
Wapello, IA, 2001	Soybean; Golden Harvest H3005	forage	13	27	<0.05, <0.05
		hay		41	0.084, 0.102
Keokuk, IA, 2001	Soybean; Golden Harvest H3005	forage	13	27	0.117, 0.13
		hay		41	0.049, 0.064
Cass, ND, 2001	Soybean; Corona	forage	13	40	<0.05, <0.05
		hay		47	0.088, 0.097
Cass, ND, 2001	Soybean; Corona	forage	13	40	0.058, 0.076
		hay		47	0.208, 0.218
York, NE, 2001	Soybean; NE 1900	forage	15	27	<0.05, <0.05
		hay		46	0.089, 0.099
Hall, NE, 2001	Soybean; NE 1900	forage	14	27	<0.05, <0.05
		hay		49	0.072, 0.076

¹ Represents the number of days after planting (DAP) rotational crop samples were harvested; bean and pea foliage were sampled at three sampling intervals. Soybean forage and hay were only collected at one sampling interval.

Table 2.3. Summary of Residue Data from Rotational Crop Trials with BAS 510 F Applied to the Soil.

Commodity	Total Application Rate (lb ai/A)	Plant-Back Interval (days)	Residue Levels (ppm)			
			Maximum	HAFT	Mean	Std. Dev.
Bean, forage	1.82	14	1.05	1.02	0.24	0.32
Bean, hay	1.82	14	1.50	1.00	0.34	0.37
Pea, vine	1.82-1.86	13-14	<0.05	<0.05	<0.05	0.0
Pea, hay	1.82-1.86	13-14	0.15	0.15	0.09	0.03
Soybean, forage	1.81-1.85	13-15	0.202	0.183	0.08	0.08
Soybean, hay	1.81-1.85	13-15	0.540	0.454	0.15	0.41

Apparent residues of BAS 510 F in all untreated samples of bean forage and hay, field pea vines and hay, and soybean forage and hay were below the method LOQ (<0.05 ppm).

3. Discussion

3.1. Methods

At each field trial, three sequential applications of the 70% WG formulation were made to the bare soil surface. The first application was made at ~0.72 lb ai/A (~0.81 kg/ha) followed by two applications at ~0.55 lb ai/A/application (~0.62 kg ai/ha/application), with 6- to 8-day retreatment intervals, for a total rate of 1.81-1.86 lb ai/A (2.03-2.08 kg ai/ha). The rotational crops, beans (cowpeas), field peas, and soybeans, were planted 13-15 days following the last application to the soil. We note that following rotational crop emergence, another experimental active ingredient (BAS 500 F; pyraclostrobin) was applied foliarly in the bean and pea trials; data for the BAS 500 F active ingredient are not reviewed herein.

Samples of the rotational crops, bean (forage and hay), field pea (vines and hay), and soybean (forage and hay), were collected at normal maturity. Soybean seed samples were also collected; refer to the soybean seed 860.1900 DER for MRID 45623412 for these data. Samples were analyzed for residues of BAS 510 F using LC/MS/MS Method D9908. Concurrent method recovery data included in the submissions indicate that the LC/MS/MS method is acceptable for data collection.

Three trials were conducted in Regions 2 (1 trial; NC), 4 (1 trial; AR), 6 (1 trial; OK) on bean (cowpea), three trials were conducted in Region 11 (WA, OR, and ID) on field peas, and 15 trials were conducted on soybeans in Regions 2 (2 trials; GA and NC), 4 (2 trials; AR), and 5 (11 trials; IA, IL, ND, and NE) as rotational crops. These crops are the representative commodities of the Foliage of Legume Vegetable Group (Crop Group 7). OPPTS 860.1900 requires that the same number of trials for primary tolerances be conducted on crops for which rotational crop tolerances would be required. The geographical representation is adequate for beans, field peas, and soybeans as required by 860.1500 (Table 2).

The maximum storage intervals for rotational crop samples from the submitted extended rotational crop studies from harvest to analysis were 119 days (3.9 months) for bean forage and hay, 97 days (3.2 months) for pea vines, 101 days (3.3 months) for pea hay, 108 days (3.6 months) for soybean forage, and 139 days (4.6 months) for soybean hay. Adequate storage stability data (refer to the 860.1380 DER for MRID 45405109) are available which demonstrate that residues of BAS 510F are stable for up to 12 months in/on various crop commodities including wheat forage and straw. The available storage stability data support the storage conditions and intervals of the rotated bean forage and hay, pea vine and hay, and soybean forage and hay samples.

3.2. Results

In rotational crops planted 13-15 days following the last application of the 70% WG formulation to bare soil, residues of BAS 510 F were <0.05-1.05 ppm in bean (cowpea) forage, <0.05-1.50 ppm in bean hay, <0.05 ppm in pea vines, <0.05-0.15 ppm in pea hay, <0.05-0.202 ppm in

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soybean forage, and <0.05-0.540 ppm in soybean hay. It is noted that the maximum residue reported in pea hay is 10x less than that reported in bean hay.

Weather conditions at application were provided. The soil at the trial sites was loam, clay, sand, silt loam, silty clay loam, and loamy sand. Information was provided pertaining to soil composition, pH, CEC, OM and bulk density; no unusual characteristics were reported.

4. Deficiencies

None.

5. References

45672101 Wofford, J.; et al (2002) A Summary of Weather Conditions for BAS 510 F Field Residue Studies Conducted from 1999-2001 Data: BASF Registration Document Number: 2002/5002878. Unpublished study prepared by BASF Agro Research. 24 p.