DIMETHENAMID-P (214)

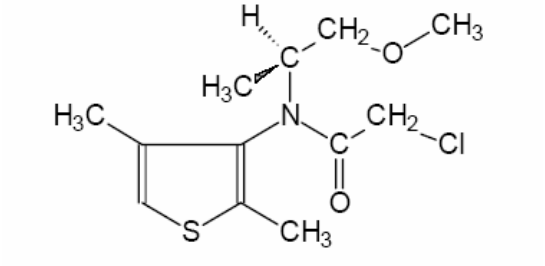
First draft prepared by David Lunn, New Zealand Food Safety Authority, Wellington, New Zealand.

EXPLANATION

Dimethenamid-P, a chloroacetamide herbicide, is the herbicidally active enantiomer in dimethenamid (this being a racemic mixture of S-dimethenamid and R-dimethenamid). When applied as a pre-emergent or early post-emergent treatment, dimethenamid-P is active against germinating broad-leaved and grass weeds, being taken up through the coleoptiles (grass seedlings) or the roots and emerging shoots (dicotyledonous seedlings) and reducing cell division and growth.

Residue and analytical aspects of dimethenamid-P were considered for the first time by the present meeting. The manufacturer submitted studies on metabolism, analytical methods, supervised field trials, processing, freezer storage stability, environmental fate in soil and rotational crop residues. Most of these studies involved dimethenamid (the racemic mixture) with supporting or bridging studies with dimethenamid-P also being provided.

IDENTITY

ISO common name:	Dimethenamid-P (proposed)
Synonyms or code numbers	S-dimethenamid dimethenamid-O DMTA-p BAS 656-H BAS 656-PH SAN 1289 H (superseded)
IUPAC name:	(S)-2-chloro-N-(2,4-dimethyl-3-thienyl)-N-(2-methoxy-1-methylethyl)acetamide
Chemical Abstracts name:	2-chloro-N-(2,4-dimethyl-3-thienyl)-N-[(1S)-2-methoxy-1-methylethyl]-acetamide
Alternative name	S-2-chloro-N-((1-methyl-2-methoxy)ethyl)-N-(2,4-dimethyl-thien-3-yl)-acetamide
CAS number	163515-14-8
CIPAC number	638
Molecular mass:	275.8 g/mol
Molecular formula	$C_{12}H_{18}ClNO_2S$
Structural formula:	

In this evaluation, the term 'dimethenamid' refers to the 50:50 mixture of R-dimethenamid and S-dimethenamid while the term 'dimethenamid-P' refers to the herbicidally active S-dimethenamid, containing up to 10% of the inactive enantiomer.

Physical and Chemical Properties

The information in the following tables relate to dimethenamid-P unless otherwise stated.

Pure active ingredient

Characteristic	Value	Reference
Colour and physical state	Yellow brown clear liquid at room temperature	KröhL T., 1999 [Ref: 1999/10167]
Odour	Faint aromatic odour	KröhL T., 1999 [Ref: 1999/10167]
Melting point	Solidification point below –50°C	KröhL T., 1999 [Ref: 1999/10167]
Boiling point	No boiling point detected until 280°C	KröhL T., 1999 [Ref: 1999/10167]
Relative density	1.195 g/cm^3 at 20°C	KröhL T., 1999 [Ref: 1999/10167]
Vapour pressure	3.47 (± 1.29) X 10^{-3} Pa at 20°C 2.51 (± 0.39) X 10^{-3} Pa at 25°C (equivalent results)	Chen H. and Laster W., 1996 [Ref: 1996/5418]
Solubility in water	1449 ± 17 mg/L at 25°C and pH 6.16 ± 0.28 No dissociation in water	Laster W., 1996 [Ref: 1996/5411]
Dissociation constant	No indication of dissociation of dimethenamid (the racemic mixture) between pH of 1 and 11 at 25°C.	Rozek A., 1988 [Ref: 1988/11352]
Henry's law constant	4.80 X 10^{-4} Pa m^3/mol.	Hsieh T., 1999 [Ref: 191999/5002]
Partition coefficient (n-octanol/water)	Log P_{OW} 1.89 at 24°C Effect of pH not investigated since there is no dissociation in water	Lam W.W., 1998 [Ref: 1998/5071]
Hydrolysis rate	Stable in pH 5.0, pH 7.0 and pH 9.0 sterile buffer solutions at 25 ± 1°C for 31 days in the absence of light	Guirguis A.S., 1997 [Ref: 1997/5184]
Photochemical degradation	DT_{50} = 14-16 days at pH 7.0. First order kinetics Major photodegradation products are M3 (0.31%), M9 (0.82%), M11 (1.64%) and Compound I (1.30%).	Guirguis A S., 1997 [Ref: 1997a/5195]
	The quantum yield of dimethenamid is 0.007402 at pH 7 and the lifetime of 5.97 days in spring at 40°N	Sen P.K. and Yu C.C., 1994 [Ref: 1994/10636]
	Calculated atmospheric degradation half-life of dimethenamid: DT_{50} = 2.45 hours	Scharf J., 1999 [Ref: 1999/10075]

Technical material

Characteristic	Value	Reference
Colour and physical state	Dark brown liquid at 22°C.	Chen H., 1997b [Ref: 1997/5198]
Odour	Strong unpleasant musty odour.	Jones R., 1997 [Ref: 1997/5186]
Boiling point	122.6°C at 9.3 Pa	Chen H., 1997a [Ref: 1997/5194]
Relative density	1.196 g/mL 20°C	Widlak A., 1997 [Ref: 1997/5193]

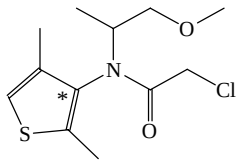
Solubility in organic solvents	Soluble in all proportions in tetrahydrofuran, isopropyl alcohol, acetone, acetonitrile, dimethyl sulfoxide, dichloromethane, toluene and n-octanol at 25°C. Solubility in hexane at 25°C is 20.8 g/100 mL	Liu J., 1997 [Ref: 1997/5196]

Formulations

Dimethenamid-P is available as an emulsifiable concentrate (EC) formulation containing 720 g ai/L, and may contain up to 10% of the herbicidally inactive R-dimethenamid (dimethenamid-M)

METABOLISM

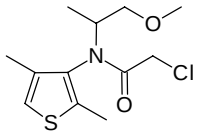
Radiolabelled dimethenamid (containing 50% dimethenamid-P) was used in plant and animal metabolism studies and in the rotational crop study.



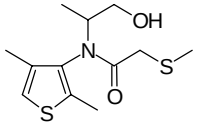
* denotes the position of the ^{14}C label

Structures, names and codes for metabolites reported in the plant and animal metabolism studies are summarised below.

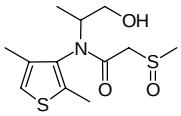
dimethenamid (BAS 656 H)
2-chloro-N-((1-methyl-2-methoxy)ethyl)-N-(2,4-dimethyl-thien-3-yl)acetamide



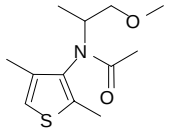
M1
N-(2,4-dimethyl-3-thienyl)-N-(2-hydroxy-1-methylethyl)-2-(methylthio)acetamide



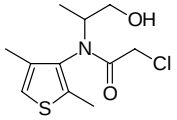
M2
N-(2,4-dimethyl-3-thienyl)-N-(2-hydroxy-1-methylethyl)-2-(methylsulfinyl)acetamide



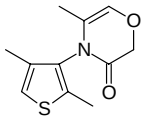
M3
N-(2,4-dimethyl-3-thienyl)-N-(2-methoxy-1-methylethyl)acetamide



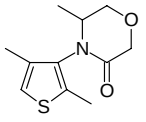
M7
2-chloro-N-(2,4-dimethyl-3-thienyl)- N-(2-hydroxy-1-methylethyl)acetamide



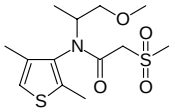
M8
3,4-dihydro-4-(2,4-dimethyl-3-thienyl)-5-methyl-2H-1,4-oxazin-3-one



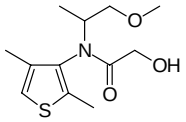
M9
4-(2,4-dimethyl-3-thienyl)-5-methyl-3-morpholinone



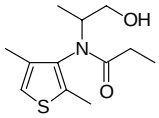
M10
N-(2,4-dimethyl-3-thienyl)-N-(2-methoxy-1-methylethyl)-2-(methyl-sulfonyl)acetamide



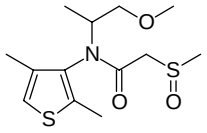
M11
N-(2,4-dimethyl-3-thienyl)-2-hydroxy-N-(2-methoxy-1-methylethyl)acetamide



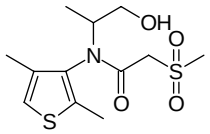
M12
N-(2,4-dimethyl-3-thienyl)-N-(2-hydroxy-1-methylethyl)acetamide



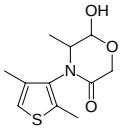
M13
N-(2,4-dimethyl-3-thienyl)-N-(2-methoxy-1-methylethyl)-2-(methylsulfinyl)acetamide



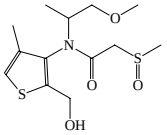
M14
N-(2,4-dimethyl-3-thienyl)-N-(2-hydroxy-1-methylethyl)-2-(methylsulfonyl)acetamide



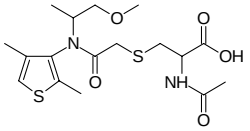
M15
4-(2,4-dimethyl-3-thienyl)-6-hydroxy-5-methyl-3-morpholinone



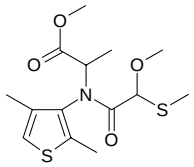
M16
N-(2-hydroxymethyl-4-methyl-3-thienyl)-N-(2-methoxy-1-methylethyl)-2-(methylsulfinyl)acetamide



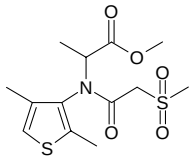
M17
N-acetyl-S-(2-(N'-(2,4-dimethyl-3-thienyl)-N'-(2-methoxy-1-methyl ethyl)amino)-2-oxoethyl)cysteine



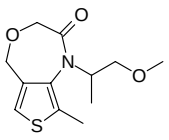
M18
methylated N-(2,4-dimethyl-3-thienyl-N-(2-methoxy-2-methylthio-acetyl)alanine



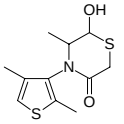
M19
methylated N-(2,4-dimethyl-3-thienyl)-N-((methylsulfonyl)acetyl)alanine



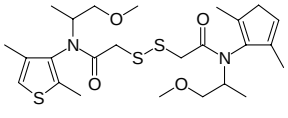
M20
1,5-dihydro-1-(2-methoxy-1-methylethyl)- 8-methyl-thieno-[3,4-f][4,1]oxazepin-2(3H)-one



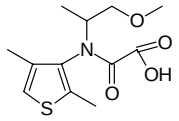
M21
4-(2,4-dimethyl-3-thienyl)-6-hydroxy-5-methyl-3-thiomorpholinone



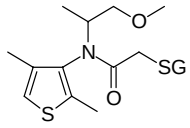
M22
2,2'-dithiobis(N-(2,4-dimethyl-3-thienyl)-N-(2-methoxy-1-methylethyl)acetamide)



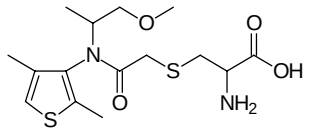
M23 (oxalamide)
2,2'-dithiobis(N-(2,4-dimethyl-3-thienyl)-N-(2-methoxy-1-methylethyl)acetamide)



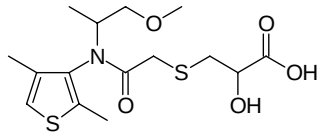
M24
2-[N-(2,4-dimethyl-3-thienyl)-N- (2-methoxy-1-methylethyl)amino]-2-oxoethyl-glutathione



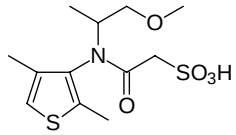
M25
2-[N-(2,4-dimethyl-3-thienyl)-N- (2-methoxy-1-methylethyl)amino]-2-oxoethyl-cysteine



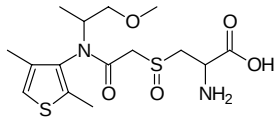
M26
2-[N-(2,4-dimethyl-3-thienyl)-N-(2-methoxy-1-methylethyl)amino]-2-oxoethyl-thiolactic acid



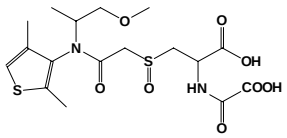
M27 (sulfonate)
2-[N-(2,4-dimethyl-3-thienyl)-N- (2-methoxy-1-methylethyl)amino]-2-oxoethyl-sulfonic acid



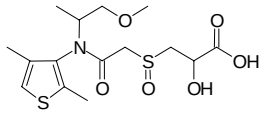
M28
2-[N-(2,4-dimethyl-3-thienyl)-N- (2-methoxy-1-methylethyl)amino]-2-oxoethyl-sulfonic acid



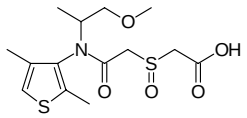
M29
sulfoxide of 2-[N-(2,4-dimethyl-3-thienyl)-N-(2-methoxy-1-methylethyl)amino]-2-oxoethyl-N-malonyl cysteine



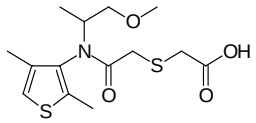
M30
sulfoxide of 2-[N-(2,4-dimethyl-3-thienyl)-N-(2-methoxy-1-methylethyl)amino]-2-oxoethyl thiolactic acid



M31
sulfoxide of 2-[N-(2,4-dimethyl-3-thienyl)-N-(2-methoxy-1-methylethyl)amino]-2-oxoethyl thioglycolic acid



M32
2-[N-(2,4-dimethyl-3-thienyl)-N- (2-methoxy-1-methylethyl)amino]-2-oxoethyl-thioglycolic acid



Animal metabolism

The Meeting received animal metabolism studies on lactating goats and laying hens, following oral dosing with [3-^{14}C-thienyl] dimethenamid (the racemic mixture).

Rats

The metabolism of dimethenamid in rats was evaluated by the WHO Core Assessment Group of the 2005 JMPR, where it was concluded that dimethenamid was slowly but well absorbed after oral administration and extensively metabolised by rats. Maximum concentrations in blood were not achieved until about 72 hours. Excretion was rapid and primarily via bile, between 45% and 64% of the oral dose being excreted within 7 hours by this route. By 7 days after treatment, an average of

90% of the administered dose was eliminated. Levels in tissues (other than blood) were low regardless of the dose or frequency of dosing. There was no evidence of bioaccumulation and no significant difference in absorption, distribution and elimination between sexes.

The metabolic pathway was primarily through glutathione conjugation, with other pathways involving reductive dechlorination, oxidation, hydroxylation, *O*-demethylation and cyclization as well as conjugation with glucuronic acid. Unchanged dimethenamid in excreta accounts for only 1–2% of the administered dose, more than 40 metabolites having been detected. At least 20 of these metabolites were structurally identified.

Lactating goats

A lactating goat was orally administered [3-^{14}C-thienyl]-dimethenamid in a gelatine capsule at a dose of 8.9 mg/kg bw/day for four consecutive days, this corresponding to a nominal feed concentration of 223 ppm. The results of this study have been reported in the initial report by Yu and Guirguis, 1990 [Ref: 1990/11112] and in several supplementary reports by Yu and Guirguis, 1992 [Ref: 1992/12431], Guirguis and Yu, 1992a and 1992b [Ref: 1992/12432] and [Ref: 1992/12499]. In this study, it was noted that the test animal suffered from diarrhoea, a loss of appetite and lost weight during the study period, and it was commented that this could be substance-related. However it was considered that the use of the relatively high dose rate was needed for metabolite identification reasons.

Urine and faeces were collected separately 7 and 24 hours after the first dosing and daily thereafter. Milk samples were collected twice daily, in the morning before each dosing and in the afternoon, about 7 hours after dosing. The animals were sacrificed 7 hours after last of the four doses.

Faeces, urine, liver, kidney and muscle were extracted using acetone and methanol, with urine also being further extracted using ethyl acetate. Non-extractable residues from faeces, liver, kidney and muscle were released using enzymes, acid and/or base hydrolysis. Butterfat was separated from milk by centrifuge and the remaining milk fraction was extracted using methanol with the remaining radioactivity being further released by acid and base hydrolysis. Fat was extracted with hexane, methanol and chloroform with non-extractable residues being released using acid and base hydrolysis. Metabolites in urine, faeces, milk, and tissues were identified using GC/MS and/or co-chromatography with reference standards.

Following administration, 36% of the administered dose was excreted in either urine or faeces and less than 2.3% TRR remained in animal tissues (0.02% in milk) at the end of the study.

In milk sampled 7 hours and 24 hours after the first treatment, residue levels (rounded) were measured at 0.5 mg/kg and 0.2 mg/kg respectively, these increasing to 0.9 mg/kg and 0.7 mg/kg in samples taken 7 and 24 hours after the second treatment, and 1.0 mg/kg and 0.6 mg/kg, respectively on the third day. A plateau was reached after 3 days. Residue concentrations in kidney, fat, muscle and liver were 9.9, 1.0, 1.0 and 17 mg/kg, respectively.

Recognising the low recovery rate in the above study, partly explained by the loss of a urine sample and reduced faecal production, a supplementary material balance study was also conducted, where a single goat was dosed once with 10 mg/kg [3-^{14}C-thienyl] dimethenamid (equivalent to 250 ppm in the diet) and radioactivity measured in urine, faeces and milk over the subsequent 5 days (Yu and Nietschmann, 1990 [Ref: 1990/11113]. In this second study, more than 59% and 28% of administered dose was excreted in the urine and faeces, respectively at the end of the 5 day study.

Table 1. Distribution of orally administered [3-^{14}C-thienyl]-dimethenamid in a lactating goat.

Fraction	Initial study (223 ppm diet equiv)		Supplementary 5-day study (250 ppm diet equiv)
	%Total dose	mg/kg equivalent	%Total dose

Fraction	Initial study (223 ppm diet equiv)		Supplementary 5-day study (250 ppm diet equiv)
	%Total dose	mg/kg equivalent	%Total dose
Milk - 7 hrs after 1st dose		0.51	
Milk - 24 hrs after 1st dose		0.17	
Milk - 7 hrs after 2nd dose		0.90	
Milk - 24 hrs after 2nd dose		0.69	
Milk - 7 hrs after 3rd dose		0.98	
Milk - 24 hrs after 3rd dose		0.62	
Milk – 7 hrs after 4th dose		0.59	
Milk - total	0.022		0.09
Liver[1]	0.75	16.62	-
Kidney[1]	0.08	9.92	-
Fat[1]	0.05	0.97	-
Muscle[1]	1.36	0.97	-
Urine[2]	27.26		59.17
Faeces	8.94		28.08
Total	38.46		87.3

[1]) Sampled at 79 hours (7 hours after the last of four daily doses

[2]) No urine sample collected on day 3.

Table 2. Extraction of residues in goat tissues and milk after four consecutive daily oral doses of 8.9 mg/kg bw (233 ppm diet equivalents) [3-^{14}C-thienyl] dimethenamid.

	Kidney		Liver		Milk		Muscle		Fat	
	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg
Organic solvent extracts	86.6	8.59	80.6	13.39	55.9	0.53	79.7	0.77	75.6	0.73
Acid & base released[1]	3.5	0.35	6.5	1.08	16.1	0.15	6.0	0.06	13.7	0.13
Enzyme treatment[2]	1.1	0.11	0.8	0.13						
Base released[3]	2.9	0.29	3.3	0.55						
Acid released[4]	3.8	0.37	8.6	1.42						
Fat & protein					18.3	0.17	5.6	0.05		
Unextractables	9.2	0.91	3.1	0.52	5.7	0.05	5.2	0.05	4.2	0.04
Totals	107	10.6	102.8	17.1	96	0.9	96.6	0.94	93.4	0.91

[1]) Treatment of aqueous and/or solid fractions with NaOH and HCL, with ethyl acetate extraction

[2]) Treatment of aqueous fraction and unextractables with glucuronidase and sulfatase enzymes

[3]) Treatment of aqueous fraction (after enzyme release) with 5N NaOH and partitioned into ethyl acetate

[4]) Treatment of aqueous fraction (after enzyme release) with 5N HCL and partitioned into ethyl acetate

Characterisation and identification of the radiocarbon in tissues and milk indicated that no residues of parent compound were present, and metabolites present at levels above 10% of the TRR in the various tissues were M7 (kidney and fat), M17 (muscle) and M25 (milk and muscle). Residue levels (rounded) greater than 0.5 mg/kg were reported in kidney (M7 at 2.4 mg/kg, M17 at 0.9 mg/kg and M24 at 0.5 mg/kg) and in liver (M25 at 1.2 mg/kg and M22 at 1.0 mg/kg).

Table 3. Identification of residues in goat tissues and milk after four consecutive daily oral doses of 8.9 mg/kg bw (233 ppm diet equivalents) [3-^{14}C-thienyl]-dimethenamid.

	Kidney		Liver		Milk		Muscle		Fat	
	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg
Parent										
M7	24.1	2.39							24.3	0.24
M17	8.9	0.89	2.7	0.45	5.2	0.05	11.4	0.11	5.4	0.05
M22			6.1	1.02						
M24	5.2	0.52	2.2	0.37	7.9	0.07	8.3	0.08	2.1	0.02
M25	1.2	0.12	7.2	1.2	11.2	0.11	14.2	0.14	2.6	0.03
Not characterised	47.1	4.68	62.4	10.37	31.6	0.3	45.8	0.45	41.2	0.43
Totals (solvent extracted)	86.6	8.59	80.6	13.39	55.9	0.53	79.7	0.77	75.6	0.73

Dimethenamid was rapidly and extensively metabolised in the goat, with no residues of the parent compound found in milk or any of the tissues analysed. Metabolites M7 (kidney – 2.4 mg/kg), M25 (liver – 1.2 mg/kg) and M22 (liver – 1.0 mg/kg) were present at levels greater that 1.0 mg/kg, following four daily doses of dimethenamid, equivalent to 233 ppm in the diet.

The major metabolic pathway was through glutathione conjugation, followed by the formation of cysteine, mercapturate, sulfoxide of thioglycolic acid conjugates, and dimerization of a mercaptan intermediate). The other pathways included O-demethylation and reductive dechlorination.

Laying hens

In a study reported by Yu and Nietschmann, 1990 [Ref: 1990/11110] and 1992 [Ref: 1992/12430], three laying hens were fed with [3-^{14}C-thienyl]-dimethenamid at a dose rate of 10 mg/kg/day (in gelatine capsules) for four days, this being equivalent to a concentration of 167 ppm dimethenamid in the feed.

Excreta and eggs were collected daily and the animals killed 7 hours after last dosing. Because the three ^{14}C dosed hens produced an egg about every second day, only eight eggs were collected during the study and these were separated into yolk and egg white for analysis.

Excreta, egg yolk, egg white, liver, muscle and fat were first extracted with organic solvents. Non-extractable residues were released using acid and base hydrolysis. For egg yolk and egg white, the non-extractable residues were further released by enzymatic treatment with glucuronidase and sulfatase and extraction into ethyl acetate. Metabolites in excreta, liver and fat were identified by co-chromatography with reference standards, MS and/or GC/MS techniques.

Following the administration of ^{14}C-dimethenamid to laying hens, the radioactivity was rapidly excreted with more than 77% of the total applied dose being found in the excreta, less than 0.5% in liver, between 0.3% and 0.4% in muscle, 0.07% in fat and 0.02% or less in eggs. Radiolabel concentrations (dimethenamid equivalents) in egg white were 0.19 mg/kg (24 h), 0.2 mg/kg (72 h) and 0.3 mg/kg (79 h) with the related egg yolk residues being 0.01 mg/kg, 0.24 mg/kg and 0.62 mg/kg. Residue levels in fat, muscle (breast), muscle (thigh) and liver were 0.29, 0.45, 0.58 and 8.3 mg/kg, respectively.

Table 4. Distribution of radioactive residues in laying hens orally administered four consecutive daily doses of [3-^{14}C-thienyl]-dimethenamid at 10 mg/kg/day.

	%Total dose	mg/kg equivalent

	%Total dose	mg/kg equivalent
Egg white - 24 hrs after 1st dose	0.01	0.19
Egg white - 24 hrs after 3rd dose	0.01	0.2
Egg white - 7 hrs after 4th dose[1]	0.01	0.3
Egg yolk - 24 hrs after 1st dose	0.00	0.01
Egg yolk - 24 hrs after 3rd dose	0.00	0.24
Egg yolk - 7 hrs after 4th dose[1]	0.01	0.62
Liver[1]	0.48	8.3
Breast muscle[1]	0.37	0.45
Leg muscle[1]	0.31	0.58
Fat[1]	0.07	0.29
Excreta (total)	77.2	
Total[2]	78.5	

[1]) Sampled at 79 hours (7 hours after the last of four daily doses), average results from 3 hens

[2]) Radiocarbon in the GI tract at sacrifice was not measured

Table 5. Extraction and identification of residues in hen tissues and eggs after four consecutive daily oral doses of 10 mg/kg bw (167 ppm diet equivalents) [3-^{14}C-thienyl]-dimethenamid.

	Muscle		Fat		Liver		Egg white[1]		Egg yolk[1]	
	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg
Organosoluble extracts[2]	52.9	0.30	87.9	0.25	72.0	6.0	75.0	0.23	52.2	0.32
Aqueous extracts	31.0	0.18[3]	7.7	0.02[3]	21.9	1.79[2]				
Enzyme treatment[4]							19.5	0.06	43.0	0.23
Unextractables	7.9	0.05	1.4	0.004	9.7	0.8	2.8	0.008	3.8	0.02
Totals	91.7	0.53	96.9	0.28	103.7	8.64	97.3	0.29	99.0	0.61

[1]) From eggs collected 7 hours after the last of four doses

[2]) Includes ethyl acetate extracts after treatment with NaOH and HCl.

[3]) Lyophilised aqueous extracts and HCl-released water soluble solids extracts

[4]) Lyophilised aqueous extracts after glucuronidaze and sulfatase enzyme release

Metabolites M3 and M8 accounted for 5% and 7.8% of the liver TRR respectively) with other metabolites (19) each accounting 0.1 to 8% of liver radioactivity, not being identified. The aqueous phase was further investigated and several additional components were characterised, all at less than 4% of liver radioactivity. In muscle, identification of the 12 metabolites detected in the organic solvent extracts (present at less than 10% of the muscle TRR) was not possible because of the low radioactivity, nor were the additional metabolites characterised from the aqueous phase able to be identified, each of these being less than 4% of the liver ^{14}C.

The parent compound was identified in fat, at a level of 0.1 mg/kg (36% of the fat radiolabel), with at least 12 metabolites being characterised but not identified, each of these accounting for less than 9% of the TRR in fat. At least 14 metabolites, each accounted for less than 10% of TRR, were characterised in egg white, at concentrations of between 0.003 mg/kg and 0.03 mg/kg. More than eight metabolites were extracted (but not identified) from egg yolk, each being less than 10% of the yolk TRR and at levels less than 0.04 mg/kg.

Table 6. Distribution of residues in hen tissues and eggs after four consecutive daily oral doses of 10 mg/kg bw (167 ppm diet equivalents) [3-^{14}C-thienyl]-dimethenamid.

	Muscle	Fat	Liver	Egg white[1]	Egg yolk[1]

	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg
Parent			36.1	0.10						
M3					5.1	0.43				
M8					7.8	0.65				
Not characterised	52.9	0.30	51.8	0.15	59.1	4.92	75.0	0.23	52.2	0.32
Totals[2]	52.9	0.30	87.9	0.25	72.0	6.0	75.0	0.23	52.2	0.32

[1]) From eggs collected 7 hours after the last of four doses

[2]) Solvent extracted, includes ethyl acetate extracts after treatment with NaOH and HCl.

Dimethenamid was extensively metabolised with more than 77% being excreted in hens during the test period and less than 2% being found in eggs and edible tissues. Residues of 0.1 mg/kg dimethenamid were reported in fat and the major identified metabolites in liver were M3 at 0.43 mg/kg and M8 at 0.65 mg/kg following four daily doses of dimethenamid equivalent to 167 ppm in the diet.

The proposed metabolic pathway was via glutathione conjugation, reductive dechlorination followed by the formations of cysteine and mercapturate conjugates, and dimerisation of a mercaptan intermediate (found in excreta). The other pathways included O-demethylation and reductive dechlorination.

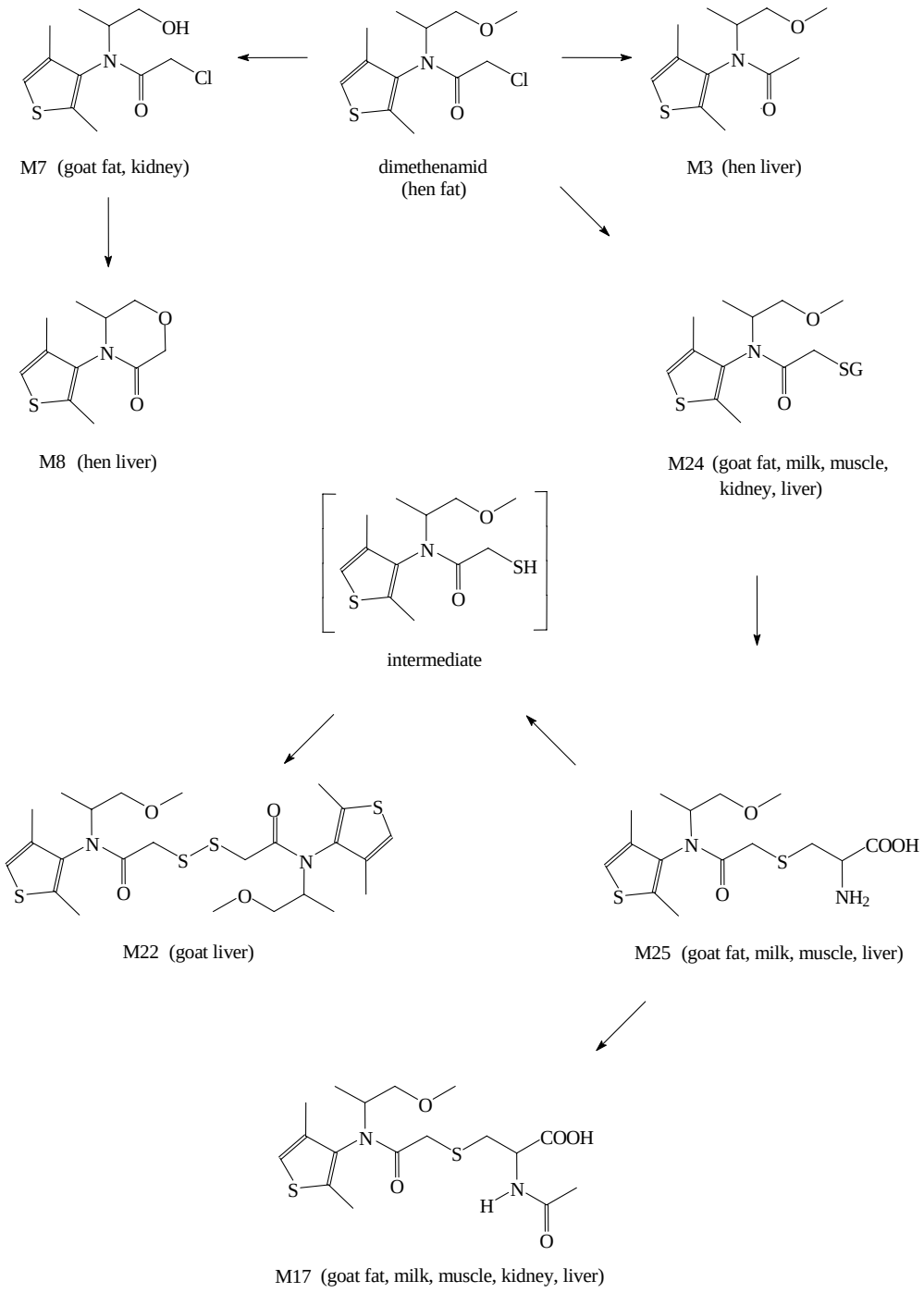


Figure 1. Proposed metabolic pathway of dimethenamid in lactating goat and laying hen.*

* Excreta not included.

Plant metabolism

The Meeting received plant metabolism studies on soya beans, maize and sugar beet, following treatment with an EC formulation of [3-^{14}C-thienyl]-dimethenamid (the racemic mixture).

Soya beans

A metabolism study in soya beans, grown in containers outdoors in Illinois, U.S.A has been reported by Atallah, Moore and Bade (1991) [Ref: 1991/11879]. Radiolabelled active ingredient, formulated as an EC was applied to a loamy soil surface (0.25 m^2) to simulate a pre-emergence herbicide use at 1.68 kg ai dimethenamid/ha and at a 2 × rate of 3.36 kg ai/ha. Seeds were planted the day before application. Forage was sampled after 49 days, immature seeds and hay sampled after 100 days, and straw and the mature seeds were sampled 118 days after treatment.

The total radioactivity in all plant parts was determined by combustion and radio assay of $^{14}CO_2$. The samples were extracted with methanol/water, the methanol evaporated and the aqueous fraction sequentially extracted with hexane (seeds only), methylene chloride, acetone, methanol and water. This last aqueous extract was then acidified (HCl), refluxed and partitioned with ethyl acetate, with the aqueous layer then being neutralised and again partitioned with ethyl acetate to obtain the aqueous soluble fraction. Solids, after the sequential extraction, were hydrolysed under acidic conditions, with the aqueous acid hydrolysate being extracted with ethyl acetate under both acid and neutral conditions. The remaining pellet was hydrolysed under alkaline conditions and the supernatant and aqueous washes were acidified to precipitate lignin. This lignin and the unextractable residues in the pellet were combusted to determine radiocarbon residues.

The organo-soluble extracts from the sequential extraction procedure were analysed by a range of thin layer chromatography (TLC) and high pressure liquid chromatography (HPLC) systems and the isolated fractions were further purified and subjected to mass spectrometry (MS) and/or nuclear magnetic resonance (NMR) analysis.

Total radiocarbon determination in samples, from the 1.68 kg ai/ha rate treatment, yielded residues (as dimethenamid equivalent) of 2.8 mg/kg in forage (DAT 49), 2.6 mg/kg in hay (DAT 100) and 1.49 mg/kg in straw (DAT 118). Immature seeds contained 0.02 mg/kg equivalent dimethenamid at DAT 100 with mature seed (DAT 118) residues being 0.41 mg/kg. Residues in the exaggerated (2×) treatment samples averaged about 1.5 times the above levels.

Extractable radiocarbon residues, accompanied by large quantities of co-extractives, were found to be highly polar in nature. Bound radiocarbon in the normal dose treatment samples increased from 5.5% (DAT 49 forage) to 16% (DAT 118 straw) and from 3.9% in immature seeds (DAT 100) to 9.8% in mature seeds (DAT 118).

Table 7. Extraction of dimethenamid equivalent residues in soya bean plants after pre-emergent soil treatment at 1.68 kg ai/ha

	Forage[1] (DAT 49)		Hay[1] (DAT 100)		Immature seeds[1] (DAT 100)		Straw[1] (DAT 118)		Mature Grain[1] (DAT 118)	
	%TRR	mg/kg	%TRR	mg/kg	%TRR	mg/kg	%TRR	mg/kg	%TRR	mg/kg
Hexane	NA	NA	NA	NA	1.4	0.002	NA	NA	5.1	0.021
CH_2Cl_2	7.9	0.22	5.8	0.15	17.5	0.022	5.8	0.086	11.3	0.046
Acetone	44.5	1.25	40.0	1.1	41.5	0.051	25.7	0.38	6.7	0.028
Methanol	18.8	0.53	22.4	0.59	22.9	0.028	29.8	0.44	22.6	0.093
Ethyl acetate[2]	5.3	0.15	10.4	0.27	2.8	0.003	13.3	0.2	26.7	0.11
Aqueous	5.8	0.16	6.9	0.18	7.4	0.009	8.5	0.13	14.3	0.06
Unextractable[3]	5.5	0.15	8.9	0.23	3.9	0.005	16.3	0.24	9.8	0.04
TRR	87.8	2.8	94.4	2.6	96	0.12	99.4	1.5	96.5	0.41

[1]) Replicate with maximum value from two studies

[2]) Combined results from acid and neutral solvent partitioning, except for forage and mature seeds, where results are from acid extraction only

[3]) 20-30% of unextractable radioactivity present in lignin

Translocation of radiocarbon to mature seeds was about 15% of that reported in forage or hay. Total radiocarbon in grain averaged 0.24 mg/kg (max 0.41 mg/kg), of which about 70% was extractable in the relatively polar solvents.

Dimethenamid was metabolised in soy bean plants to a number of polar metabolites (20-30), most being present at low levels (< 0.01 mg/kg or <3% TRR). No parent compound was detected in any of the tissue samples, even at the 2× treatment rates. Significant metabolites identified in the various extracts were: M23, the oxalamide; M27 the sulfonate and M30 and M31 the sulfoxides of the thioglycolic and the thiolactic acid conjugates.

Metabolite M23 was the most abundant metabolite found, this being in forage (DAT 49) at 0.47 mg/kg (16.7% of TRR), 0.14 mg/kg (5.3% TRR) in hay and 0.027 mg/kg (6.6% TRR) in mature seeds. Residues of the sulfonate metabolite (M27) were present in forage at a level of 0.2 mg/kg (7% TRR), in hay at a level of 0.28 mg/kg (10.6% TRR) and in mature seeds at 0.03 mg/kg (7.5% TRR). Combined residues of M30 and M31 (the sulfoxides) were 0.17 mg/kg (6% TRR) in forage, 0.2 mg/kg (7.8% TRR) in hay and 0.03 mg/kg (11.7% TRR) in mature seeds.

Table 8. Identification of residues in soy beans after pre-emergent soil treatment with dimethenamid at 1.68 kg ai/ha.

	Forage (DAT 49)[1]		Hay (DAT 100)[1]		Mature grain (DAT 118)[1]	
	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg
Parent		ND		ND		ND
M23	16.8	0.47	5.28	0.14	6.55	0.027
M27	7.0	0.2	10.6	0.28	7.54	0.031
M30 plus M31[2]	6.0	0.17	7.77	0.2	11.66	0.048
Total identified	29.8		23.7		25.8	
Not identified[3]	52.5		61.9		56	
Non-extractable	5.5		8.9		9.8	
TRR	88	2.8	94	2.6	92	0.41

[1]) Highest replicate in two studies with some values extrapolated from the 2× treatment results.

[2]) Combined sulfoxides of thiolactic acid and thioglycolic acid

[3]) Total residues from methylene chloride, acetone, methanol, ethyl acetate and water extracts with TLC or HPLC analyses reporting at least 12 peaks in each extract, each peak generally representing < 0.02 mg/kg

ND = not detected (< 0.003 mg/kg)

Maize

The metabolic fate of dimethenamid in outdoor container-grown maize plants (Illinois, U.S.A) was reported in a similar study by Moore and Wendt (1995) [Ref: 1995/10129]. Radiolabelled active ingredient, formulated as an EC was applied to a loamy soil surface (0.25 m^2) to simulate a pre-emergence treatment of dimethenamid at 1.68 kg ai and at an exaggerated (2.6×) rate of 4.4 kg ai/ha. Seeds were planted the day before application. Maize forage was sampled after 50 days; silage, immature cob and grain sampled after 116 days, and straw, mature cob and grain were sampled 130 days after treatment.

The total radioactivity in all plant parts was determined by combustion and radio assay of $^{14}CO_2$. The samples were extracted with methanol/water, the methanol evaporated and the aqueous fraction sequentially partitioned with hexane and methylene chloride under neutral and acidic conditions. The remaining aqueous fraction was lyophilised and the resulting solids were dissolved in methanol and water (multiple step extraction method). The first aqueous fraction was also lyophilised directly and the co-extractives removed by counter-current chromatography (single step extraction method). The solids after the methanol/water extraction were hydrolysed under acidic and alkaline conditions.

The organosoluble extracts from the multiple step procedure were analysed by TLC and HPLC and the isolated fractions were further purified and subjected to MS and/or NMR analysis.

Total radiocarbon determination in samples from the 1.68 kg ai/ha rate treatment yielded residues (as dimethenamid equivalent) of 0.3 mg/kg in forage (DAT 50), 0.4 mg/kg in silage (DAT 116) and 0.5 mg/kg in fodder (DAT 130). Maize grain contained 0.02 mg/kg equivalent dimethenamid at DAT 116 and 130. Residues in the exaggerated (2.6×) treatment samples were 2-3 times higher than the above values.

Extractable radiocarbon residues, accompanied by large quantities of co-extractives, were found to be highly polar in nature. Bound radiocarbon in the normal dose treatment samples increased from 9% (DAT 50 forage) to 51% (DAT 130 grain).

Table 9. Extraction of dimethenamid equivalent residues in maize plants after pre-emergent soil treatment at 1.68 kg ai/ha

	Forage[1] (DAT 50)		Silage[1] (DAT 116)		Fodder[1] (DAT 130)		Grain[1] (DAT 116)		Grain[1] (DAT 130)	
	TRR%[2]	mg/kg	TRR%[2]	mg/kg	TRR%[2]	mg/kg	TRR%[2]	mg/kg	TRR%[2]	mg/kg
MeOH	0.21	0.0006	0.1	0.0004	0.47	0.002	ND		1.1	0.0002
Hexane	2.74	0.008	0.88	0.004	1.4	0.007	ND		4.4	0.001
CH_2Cl_2 neutral	7.82	0.02	5.2	0.02	6.0	0.03	8.2	0.002	3.7	0.009
CH_2Cl_2 acid	16.3	0.05	10.5	0.04	7.1	0.04	5.3	0.001	5.5	0.001
MeOH-extracted lyophylisate	32.2	0.01	35.5	0.14	10.7	0.05	17.6[3]	0.004	22.2[3]	0.005
Water soluble lyophylisate	9.45	0.03	3.0	0.001	13.0	0.07				
Residual TRR[4]	2.87	0.01	4.8	0.02	5.7	0.03	1.0	0.0002	17.8	0.004
Non extractable[5]	12.3	0.04	24.6	0.1	43.1	0.2	46.7	0.01	51.4	0.01
TRR	83.9	0.3	84.6	0.4	87.5	0.5	78.8	0.02	106.2	0.02

[1]) Average of four replicates.

[2])% of methanol/water extractable radioactivity.

[3]) Aqueous fraction not freeze-dried to determine the methanol soluble radiocarbon because of low radioactivity in these samples (< 0.01mg/kg).

[4]) Radioactivity remaining on flask walls and traces of emulsion layers formed during organic/aqueous extraction.

[5]) Sum of the acid hydrolysate values and combustion values of the remaining solid pellet.

ND = not detected, below the limit of detection of the scintillation counter.

Translocation of radiocarbon to grain was minimal. Total radiocarbon in grain was 0.02 mg/kg of which about 50% was unextractable. All extractable fractions in grain were < 0.01mg/kg and no individual grain residues could therefore be characterised further. The extractable radiocarbon was distributed between four fractions each containing no more than 0.005 mg/kg dimethenamid equivalents thus all individual extractable residues were < 0.01 mg/kg.

Dimethenamid was metabolised to several weak acids and other highly polar residues. Consistently in all plant parts there were a large number of individual residue fractions present in very small amounts. Unchanged dimethenamid was not present in any of the forage, silage, grain or straw samples, even at the exaggerated (4.4 kg ai/ha) application rate.

The metabolic profiles in all maize samples were qualitatively similar and six metabolites were identified in various extracts, these were: M32, the thioglycolic acid conjugate; M26, the thiolactic acid conjugate; M23, the oxalamide; M31 the sulfoxide of the thioglycolic acid conjugate; M30, the sulfoxide of the thiolactic acid conjugate and M27 the sulfonate. M27 was the most

abundant metabolite found, this being extracted in the methanol soluble freeze-dried aqueous fraction and measured in silage (DAT 116) at 0.03 mg/kg (7.38% of TRR).

In the organic extracts, combined levels of M23 (the oxalamide) and M26 (the thiolactic acid conjugate) were highest in the forage, at a level of 0.011 mg/kg dimethenamid equivalents. In seedlings the extract in the TLC band(s) with R_f similar to M32 thioglycolic acid was found to contain M11 and/or M9 upon further TLC characterisation. The same band(s) in the fodder extract represented 0.029 mg/kg or 5.6% TRR. The highest level of M30 occurred at the silage stage at 0.012 mg/kg or 2.9% TRR.

Table 10. Identification of residues in maize plants after pre-emergent soil treatment with dimethenamid at 1.68 kg ai/ha.

	Forage (DAT 50)		Silage (DAT 116)		Fodder (DAT 130)		Grain (DAT 130)	
	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg
Parent		ND		ND		ND		ND
M23	3.6	0.01	0.6	0.002	1.4[1]	0.007[1]		ND
M26	2.3	0.007	1.2	0.005				ND
M27	6.1	0.02	7.4	0.03	2.5	0.01		ND
M30	1.6	0.005	3.7	0.02	2.0	0.01		ND
M31	1.7	0.005	2.9	0.01	0.7	0.003		ND
M32	<3.7	< 0.01	< 0.6	< 0.002	<5.6	< 0.03		ND
Total Identified	19		16		12			
Not identified	56		61		39			
Non-extractable	9		19		37		51	
TRR	84	0.3	85	0.4	88	0.5	106	0.02

[1]) Values for M23 and M26 combined
ND = not detected, limit of detection ranged from 0.001 to 0.005 mg/kg.

Sugar beet

A metabolism study by Lam, 1996 [Ref: 1998/5173] was conducted in Switzerland to determine the nature and amount of residue uptake in sugar beet. Seeds were planted to a depth of 1.5 cm into a sandy loam top soil, in containers (0.5 m^2) and kept in a greenhouse for the first 41 days before being moved to an outdoor shed until harvest. [3-^{14}C-thienyl] dimethenamid, formulated as an EC, was applied at rates equivalent to the maximum label rate and exaggerated rates.

For the maximum label use rate, dimethenamid was applied three times at a rate equivalent to 0.45 kg ai/ha per application, with the first treatment being just after the cotyledons were completely unfolded (8 days after planting) and subsequent treatments being 9 and 21 days later.

Sugar beet roots and leaves with tops were sampled 126 days after the last of these three treatments and radioactive residues were determined using both the fresh and freeze-dried samples. The samples were extracted with a mixture of methanol:water (80:20), the methanol evaporated and the aqueous layer extracted with methylene chloride. The aqueous fraction was freeze-dried, redissolved and the radioactivity was determined by LSC and the remaining plant fractions were combusted to determine the residual radioactivity.

The results from this study showed that the ^{14}C levels in roots (0.08 mg/kg dimethenamid equivalents) were about 3.5 times lower than in the tops (0.28 mg/kg equivalents) with 83% TRR (roots) and 95% TRR (tops) being found in the methanol:water extracts.

Combustion of the remaining bound residue in roots and tops indicated their ^{14}C levels to be 0.02 mg/kg (20.5% TRR) and 0.02 mg/kg (6% TRR), respectively. The bound residues in roots were further hydrolyzed with 6N HCl and 6N NaOH solutions, with residues of < 0.01 mg/kg being reported and these were not further characterised.

Table 11. Extraction of dimethenamid equivalent residues in sugar beet plants treated early post-emergent at 3 × 0.45 kg ai/ha.

	Roots		Tops	
	% TRR	mg/kg	% TRR	mg/kg
MeOH	80.5	0.06	93.6	0.27
Aqueous	3.0	0.002	1.7	0.005
Total extracted	83.5	0.07	95.4	0.27
Non-extracted	20.5	0.02	6	0.02
TRR	104	0.08	101	0.29

Analysis of the methylene chloride extracts from root and tops by TLC and HPLC after a multiple step clean-up procedure, identified four metabolites in root extracts (M23, M27, M28 and M29) at levels up to 6% TRR and three metabolites in extracts from the tops (M27, M29, M30) at levels up to 9.4% TRR. Numerous polar metabolites were characterised, but at levels either below 10% of the TRR or < 0.01 mg/kg dimethenamid equivalents. No parent compound residues were detected in any samples.

Table 12. Identification of residues in sugar beet plants treated early post-emergent with dimethenamid at 3 × 0.45 kg ai/ha.

	Roots		Leaves and tops	
	%TRR	mg/kg	%TRR	mg/kg
Parent	ND	ND	ND	ND
M23	1.1	0.0009		
M27	6.0	0.005	6.5	0.019
M28	2.3	0.002		
M29	5.7	0.004	1.0	0.003
M30			9.4	0.027
Total identified	15.0	0.012	16.9	0.048
Not identified	61.2	0.048	75.1	0.21
Non-extractable	16.5	0.013	4.7	0.013

Based on the metabolism studies provided on soya beans, maize and sugar beet, dimethenamid is metabolised in plants and metabolism occurs through similar pathways. The proposed metabolic pathway in plants involves conjugation of dimethenamid with glutathion and hydrolysis of the glutathion conjugate to the cysteine conjugate, both being considered transient intermediates undergoing oxidation, deamination and/or decarboxylation to form many relatively polar metabolites, all of which are generally present at levels of < 0.05 mg/kg or less than 10% of the TRR. Bound radiocarbon increased with time, indicating incorporation of residues into the plant matrix. No parent (dimethenamid) was detected in any of the plant tissues at any sampling interval.

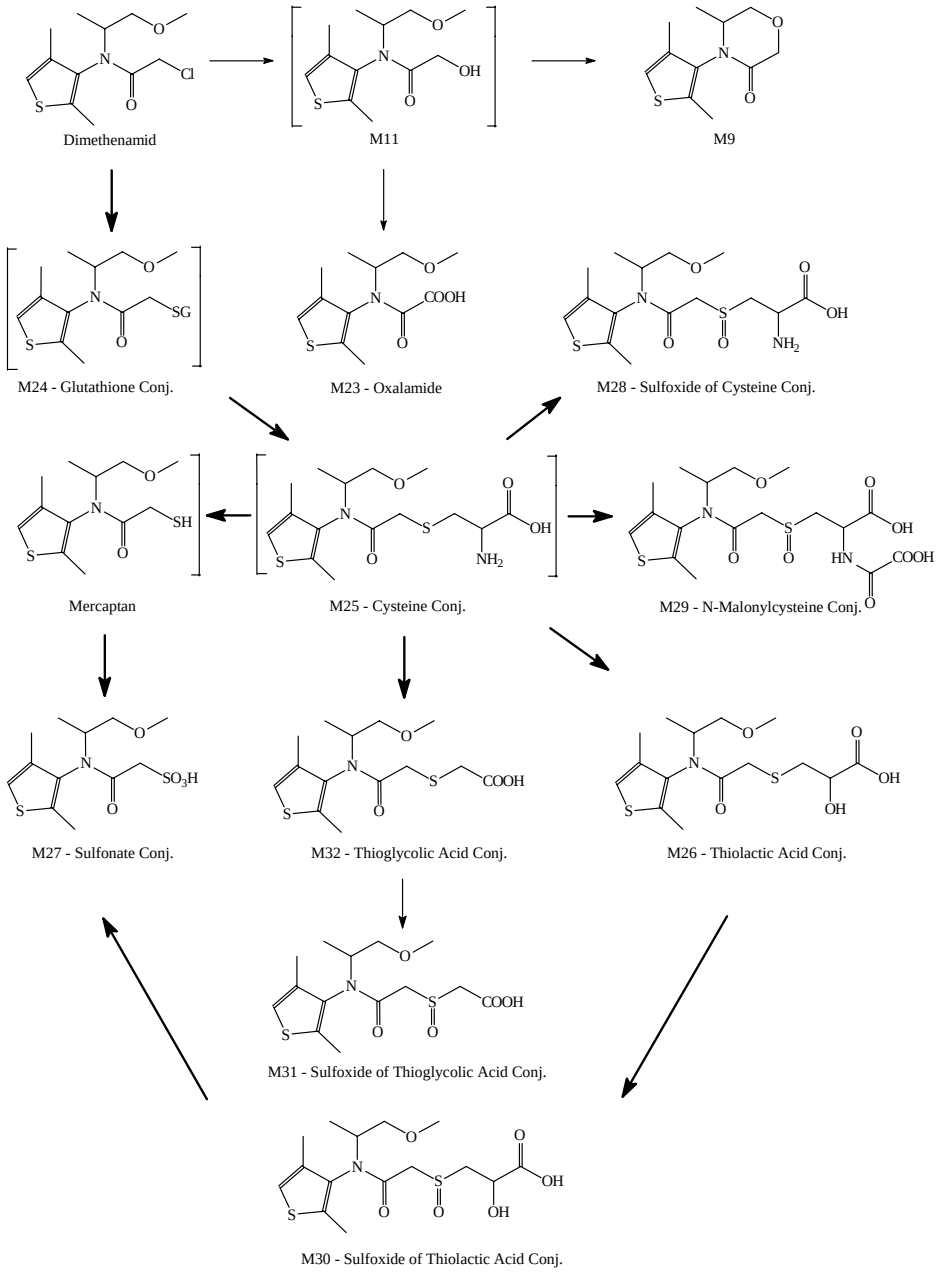


Figure 2. Proposed Metabolic Pathway of dimethenamid in plants

Note: Solid arrows indicate glutathione conjugation pathways. Metabolites in brackets indicate possible intermediates not detected in plant metabolism studies

The following table lists the major breakdown products of dimethenamid reported in plants and animals.

Table 13. Summary of major dimethenamid metabolites identified in plants and animals

Metabolite	Soya beans	Sugar beet	Maize	Hen	Goat
M23	X	X	X		
M24			X[1]	X	X

Metabolite	Soya beans	Sugar beet	Maize	Hen	Goat
M25			X[3]	X	X
M26		X	X		
M27	X	X	X	X	
M30	X	X	X	X	
M32		X	X	X	
M31	X	X	X		X

X: in vivo; identified in two chromatographic systems

Y: in vitro; rat liver homogenate study

Environmental fate

The meeting received information on hydrolytic stability of dimethenamid-P, on the behaviour and fate of dimethenamid-P and dimethenamid in aerobic soils and also the metabolism of dimethenamid in lettuce, carrots, winter and summer wheat, grown as rotational crops.

Hydrolysis

The stability of dimethenamid was reported by Guirguis, 1997 [Ref: 1997/5184]. Dimethenamid was stable in aqueous buffered solutions at pH 5, 7 and 9 when stored at 25°C in the dark for 31 days.

Aerobic soil metabolism

The aerobic soil metabolism of 3-^{14}C-thienyl dimethenamid-P and 3-^{14}C-thienyl dimethenamid were compared in a clay loam soil (Illinois, USA) by Wendt, 1997 [Ref: 1997/5257]. In this study, soil was treated with 1.994 mg dimethenamid or dimethenamid-P per kg dry soil, to reflect the estimated concentration within the top 5cm of soil following a pre-emergence broadcast field application at the commercially recommended rate of 1.68 kg ai/ha.

The treated soil (24% sand, 44% silt, 32% clay with an organic carbon content of 2.4%), was incubated under aerobic conditions at 23°C for 182 days and duplicate soil samples were taken after 0, 1, 3, 7, 14, 21, 28, 42, 56, 84, 119 and 182 days. Volatiles were trapped by continuously washing the effluent gas with 1 M NaOH and ethylene glycol. Soil was extracted with methanol, then methanol/0.1 M HCl. The extracts were pooled, concentrated, and characterized by TLC and HPLC. Bound residues were characterized by extraction with 0.1 M NaOH to separate the fulvic acid, humic acid, and humin fractions.

In addition, soil containing an exaggerated concentration of 9.5 mg/kg dry soil was incubated for 21 days in order to generate products in quantities sufficient for identification by GC-MS.

The total radioactive recoveries for individual incubations ranged from 91.7 to 102.8% (dimethenamid-P) and from 93.5 to 103.6% (dimethenamid). The degradation of both dimethenamid-P and dimethenamid coincided with the formation of up to seven polar metabolites, none of which exceeded 9% of the TRR. The identified metabolites were M23 (oxalamide), M32, M31, M26, M30, M11 and M27 (sulfonate). After the 182 day incubation period, $^{14}CO_2$ accounted for 28–29% TRR for both treatments. Non-extractable residues increased to 40% TRR. Up to 9% TRR was associated with the fulvic acid fraction and 25% with the humic acid fraction, respectively.

No significant differences in the degradation rates and pathways were noted in this study and the calculated DT_{50} value for the aerobic degradation of both dimethenamid-P and dimethenamid in clay loam soil at 23°C was 10 days.

Table 14. Aerobic soil metabolism of ^{14}C-dimethenamid-P and ^{14}C-dimethenamid: Recovery of radioactivity in%TRR and distribution of major metabolites.

Dimethenamid-P								
DAT	CO_2	Parent	M23	M27	M31	Others[1]	Bound Residues[2]	Total
0	0.0	94.1	0.3	0.1	0.1	6.2	0.7	101.5
1	0.4	77.7	1.0	1.1	0.9	9.7	6.3	97.1
3	0.8	69.1	3.3	2.0	3.1	7.0	10.9	96.2
7	1.6	48.9	5.2	3.5	4.4	13.9	18.3	95.8
14	3.3	32.7	7.7	6.2	6.5	13.6	26.8	96.8
21	5.2	19.1	7.9	6.6	6.9	14.1	33.1	92.9
28	7.1	14.8	7.2	7.3	5.6	17.6	34.7	94.3
42	10.7	8.4	6.3	7.8	5.4	17.9	38.0	94.5
56	14.0	6.1	4.6	5.9	4.1	21.8	38.7	95.2
84	18.9	4.3	4.3	6.8	3.5	16.1	40.3	94.2
119	23.5	2.7	3.6	5.9	3.2	14.1	39.9	92.9
182	29.2	1.6	2.4	4.9	2.1	13.7	39.9	93.8
Dimethenamid								
DAT	CO_2	Parent	M23	M27	M31	Others[1]	Bound Residues[2]	Total
0	0.0	93.3	0.3	0.1	0.1	7.5	0.4	101.7
1	0.4	76.5	1.0	0.8	0.6	10.7	5.3	95.3
3	0.8	70.6	3.4	1.7	2.8	6.4	11.3	97.0
7	1.5	50.0	5.2	3.4	4.0	13.4	19.0	96.5
14	3.2	30.5	8.1	6.2	6.6	14.4	27.5	96.5
21	4.9	20.3	8.2	6.7	6.8	14.0	33.2	94.1
28	6.7	15.9	8.0	7.6	5.7	15.4	34.8	94.1
42	10.2	9.6	6.4	8.0	5.1	16.1	38.4	93.8
56	13.3	6.6	4.8	6.0	3.3	22.4	38.7	95.1
84	18.5	4.4	4.8	7.6	3.3	16.6	43.5	98.7
119	23.1	2.7	3.5	6.3	3.4	15.2	40.8	95.0
182	28.5	1.5	2.7	5.9	2.1	14.5	39.5	94.7

[1]) Multiple components including M11, M26, M30 and M32 and other unidentified metabolites, all <5%TRR

[2]) Includes humic and fulvic acid and humin fractions

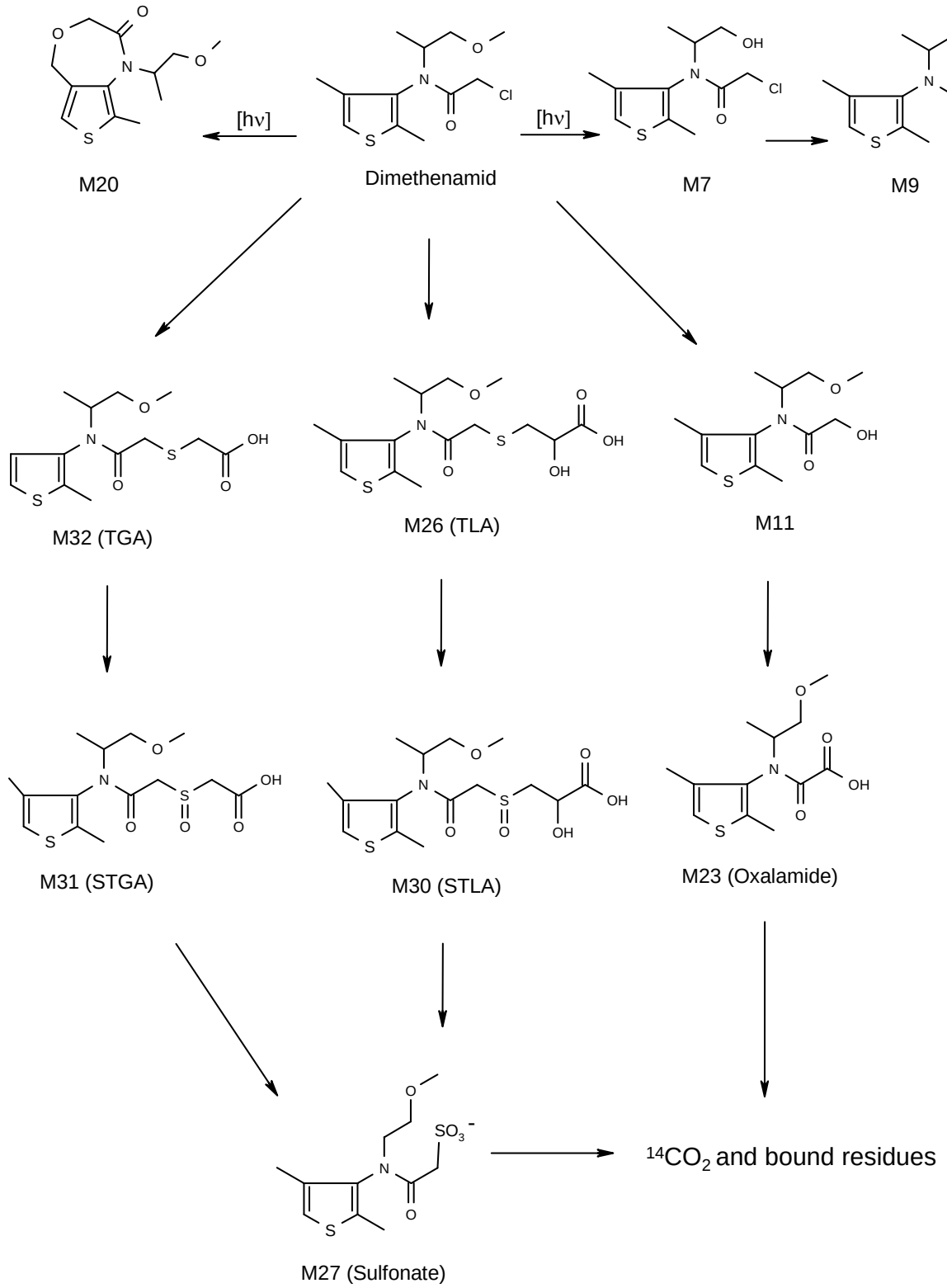


Figure 3: Proposed aerobic degradation pathway of dimethenamid and dimethenamid-P in soil

Confined rotational crops

The Meeting was provided with residue data from a confined crop rotation trial using [3-^{14}C-thienyl] dimethenamid (containing 50% dimethenamid-P), reported by Pierotti and Moore, 1992, [Ref: 1992/12425] This study was conducted on plots in Illinois, USA where maize and soya beans had

been grown as primary crops (used for metabolism studies). The residues of dimethenamid in succeeding crops were investigated after soil treatment with racemic [3-^{14}C-thienyl]-dimethenamid. Equivalent treatment rates in maize were 1.68 and 4.4 kg ai/ha and in soya bean were 1.68 and 3.36 kg ai/ha. Residues of dimethenamid in a loam soil (24% sand, 26% clay and 3.8% organic matter) were determined at 0, 141, 322 and 332 days after the initial treatment. The treated maize and soya bean crops were harvested 128 and 130 days after treatment and the confined rotation study began with planting of winter wheat at 141 DAT. Additional crops were planted the following spring at 322 DAT (spring wheat) and 332 DAT (lettuce and carrot).

Samples harvested for residue determination were forage, seed and straw of winter and spring wheat, roots of carrots and above ground portion of lettuce. The TRR of each sample was determined by combustion analysis. Soil and crops were extracted in methanol and the aqueous fraction was partitioned with hexane and then with methylene chloride. The extracted aqueous fraction was freeze-dried and the resulting residue dissolved in methanol and then deionised water. Bound residue in plant samples was released by acid and/or base hydrolysis. The soil bound residue was released by base hydrolysis. Extracts yielding residues above 0.01 mg/kg were analyzed by TLC.

The TRRs for all rotational crop samples from plots treated at a rate equivalent to 1.68 kg ai/ha of the racemic mixture, were between 0.01 mg/kg and 0.04 mg/kg in carrot roots, lettuce leaves, wheat grain and immature wheat plants, with residues of 0.06 mg/kg reported in carrot tops and 0.12 mg/kg and 0.17 mg/kg in summer and winter wheat straw respectively. Residues in the soya bean samples from the higher (2×) treatment rates were generally twice the above levels while in the high rate (2.6 ×) maize plots, samples generally contained residues 2–3 times higher than the above.

Table 15. Residues (mg/kg dimethenamid equivalents) in soil and in succeeding crops after pre-emergent treatment of maize and soya beans with [3-^{14}C-thienyl]-dimethenamid

Sample		Crop stage	DAT	Residues (mg/kg dimethenamid equivalents)			
				Maize plots		Soya bean plots	
				1.68 kg ai/ha	4.48 kg ai/ha	1.68 kg ai/ha	3.36 kg ai/ha
Primary crop							
Soil	0-10 cm[1] 10-14 cm[2]	pre-emergence	0	1.94[3] -	3.57[3] 0.07[3]	0.85[3] -	1.52[3] 0.009
Soil	0-10 cm 10-20 cm 20-30 cm	at harvest	128-30	0.37[3] 0.054[3] 0.034[3]	0.60[3] 0.16[3] 0.10[3]	0.40[3] 0.081[3] 0.059[3]	0.81[3] 0.25[3] 0.10[3]
Winter wheat							
Soil	0-10 cm 10-20 cm 20-30[4] cm	at planting	141	0.19 0.032 0.033		0.43 0.064 0.057	
Immature plants		207 DAP	348	0.0208	0.0662		0.0568
Grain		246 DAP	387	0.0264	0.0728		
Straw		246 DAP	387	0.1744	0.3944		
Spring wheat							
Soil	0-10 cm 10-20 cm 20-30 cm	at planting	322	0.095 0.025 0.014		0.33 0.078 0.044	
Immature plants		42 DAP	364	0.035	0.115	0.062	0.153
Grain		74 DAP	396	0.02	0.052	0.023	0.051
Straw		74 DAP	396	0.121	0.45	0.142	0.484
Lettuce							
Soil	0-10 cm 10-20 cm 20-30 cm	at planting	322	0.16 0.038 0.023		0.18 0.063 0.033	

Sample	Crop stage	DAT	Residues (mg/kg dimethenamid equivalents)			
			Maize plots		Soya bean plots	
			1.68 kg ai/ha	4.48 kg ai/ha	1.68 kg ai/ha	3.36 kg ai/ha
Leaves	42 DAP	364	0.018	0.073	0.038	0.093
Carrots						
Soil 0-10 cm 10-20 cm 20-30 cm	at planting	322	0.068 0.015 0.007		0.16 0.04 0.023	
Tops	89 DAP	408	0.059	0.147	0.073	0.125
Roots	86 DAP	408	0.013	0.038	0.013	0.026

[1]) Soil depth ranged from 0-10 cm to 0-12 cm in various replicates

[2]) Soil depth ranged from 10-13 to 10-15.5 cm in various replicates

[3]) Average of four replicate soil samples

[4]) Soil depth ranged from 20-27 to 20-30 cm in various samples

DAP = days after planting the rotational crop

In the rotational crop samples 56 – 96% TRR was extracted in organic solvents except in wheat grain where the range was 20 – 33.7%. All extractable residues in edible rotational crop samples were less than 0.012 mg/kg. The bound residues in wheat straw were further released by acid and base hydrolysis, with a further 6.1 – 26% TRR (0.007 - 0.045 mg/kg) being released.

Table 16. Extraction of dimethenamid equivalent residues from rotational crops planted after maize and soya bean crops treated pre-emergence with [3-^{14}C-thienyl]-dimethenamid at 1.68 kg ai/ha

Sample	Maize plots				Soya bean plots			
	Extractable		Non-extractable		Extractable		Non-extractable	
	%TRR	mg/kg	%TRR	mg/kg	%TRR	mg/kg	%TRR	mg/kg
Winter wheat immature	71.2	0.015	46.2	0.01	-		-	
Winter wheat grain	33.7	0.009	42.0	0.011	-		-	
Winter wheat straw	56.4	0.098	19.8	0.035	-		-	
Spring wheat immature	64.9	0.023	25.2	0.009	66.0	0.041	16.7	0.01
Spring wheat grain	25.0	0.005	29.6	0.006	19.9	0.005	31.2	0.007
Spring wheat straw	60.2	0.073	37.6	0.045	56.5	0.08	30.8	0.044
Lettuce leaves	60.6	0.011	47.0	0.009	67.0	0.026	33.0	0.013
Carrot tops	78.0	0.046	17.0	0.011	77.0	0.061	16.4	0.013
Carrot roots	95.4	0.012	36.2	0.005	76.9	0.01	23.1	0.003

The extracts of immature spring wheat, spring wheat straw, winter wheat straw, lettuce and carrot tops were the only extracts that were further characterised by TLC, with three metabolites (M23, M27 and M30) being identified in the rotational crops, all at levels below 0.01 mg/kg. Unidentified metabolites were also < 0.01 mg/kg and dimethenamid was not detected in any samples.

The oxalamide (M23) was identified in carrot tops (2.2-4.3% TRR). The sulfoxide of the thiolactic acid conjugate (M30) was identified in winter wheat straw (5.7% TRR), lettuce (10.7% TRR), spring wheat straw (3.1% TRR) and carrot tops (3.1–4.1% TRR). The sulfonate (M27) was identified in immature spring wheat (6.6–12.5% TRR). Bound residues were incorporated into the natural carbon pool of the rotational crop as lignin at a level of less than 0.025 mg/kg and cellulose (less than 0.02 mg/kg).

Table 17. Identification of residues in rotational crops planted after maize and soya bean crops treated pre-emergence with [3-^{14}C-thienyl]-dimethenamid at 1.68 kg ai/ha

	M23		M27		M30		Unidentified	
	%TRR	mg/kg	%TRR	mg/kg	%TRR	mg/kg	%TRR	mg/kg
Winter wheat immature[1]	all extracts below 0.01 mg/kg							
Winter wheat grain[1]	all extracts below 0.01 mg/kg							
Winter wheat straw[1]					5.7	0.01	38.1	0.067
Spring wheat immature[2]			12.5	0.008			20.7	0.018
Spring wheat immature[1]			6.8	0.003			48.2	0.011
Spring wheat grain[1]	all extracts below 0.01 mg/kg							
Spring wheat grain[2]	all extracts below 0.01 mg/kg							
Spring wheat straw[2]					3.1	0.004	66.8	0.095[3]
Spring wheat straw[1]							49.2	0.059
Lettuce leaves[2]					10.7	0.004	24.1	0.009
Carrot tops[2]	4.3	0.003			4.1	0.003	65.6	0.048
Carrot tops[1]	2.2	0.001			3.1	0.002	54.1	0.032
Carrot roots[1]	all extracts below 0.01 mg/kg							
Carrot roots[2]	all extracts below 0.01 mg/kg							

[1]) Samples from treated maize plots

[2]) Samples from treated soya bean plots

[3]) Sum of organic solvent extractable and acid/base released residues

METHODS OF RESIDUE ANALYSIS

Analytical methods

The meeting received analytical method descriptions and validation data for dimethenamid in crop and animal commodities. Analytical methods for the M27 (sulfonate) and M23 (oxalamide) metabolites and for dimethenamid-P were also provided and are summarised below.

The methods developed for dimethenamid do not differentiate between the enantiomers and are therefore applicable for analysis of matrices treated with either dimethenamid or dimethenamid-P. No methods specific for dimethenamid-P have been reported.

Table 18. Dimethenamid Analytical Methods

Maize forage, silage, grain, fodder

Smith and Bade, 1991 [Ref: 1992/12400 – Appendix IV]

Analytes:	Dimethenamid & oxalamide metabolite (M23)	GC-MS	AM-0840-0790-0
LOQ:	0.01 mg/kg		
Description	Samples extracted with methanol:water:HCl (20:80:0.5). Extracts diluted with 1N HCl and partitioned with ethyl ether:methylene chloride (1:1) before concentration and treatment with diazomethane to methylate the oxalamide metabolite (M3). Clean-up by reversed phase C_{18} solid phase extraction columns. Separation and quantitation by GC using a mass selective detector. Note: Unacceptable (high, variable) recovery rates, replaced by method BS 2304		

Maize forage, silage, grain, fodder

Smith and Bade, 1991a [Ref: 1991/11820]

Analytes:	Dimethenamid & oxalamide metabolite (M23)	GC-MS	AM-0840-0391-1
LOQ:	0.01 mg/kg		
Description	Samples extracted with methanol:water:HCl (20:80:0.5). Extracts diluted with 1N HCl and partitioned with ethyl ether:dichloromethane (1:1) before concentration and treatment with diazomethane to methylate the oxalamide metabolite (M3). Clean-up by reversed phase C_{18} solid phase extraction columns. Separation and quantitation by GC using a mass selective detector. Note: Unacceptable (high, variable) recovery rates, replaced by method BS 2304		

Maize plants, straw, grain, cobs and soil

Bourry and Hertl, 1991b[Ref: 1991/11840]

Analytes:	Dimethenamid	GC-TSD	BS1988
LOQ:	0.01 mg/kg		
Description	Samples extracted twice with methanol:water (95:5). Combined extracts cleaned-up using reversed phase C_{18} solid phase extraction columns, partitioning of the aqueous eluate with toluene and chromatography on a silica gel column using ethyl acetate:cyclohexane (2:8) elution. The eluates concentrated and dissolved in toluene before separation and quantitation by GC with a thermionic specific detector (TSD)		

Bean plants, straw, pods and beans

Greenhalgh, 1995a[Ref: 1995/5000228]

Analytes:	Dimethenamid	GC-TSD	XM-15B
LOQ:	0.02 mg/kg		
Description	As for BS1988 above, but with an additional Florasil clean-up step for whole plants		

Maize plants, straw, grain, cobs and soil

Bourry and Hertl, 1991a[Ref: 1991/11824]

Analytes:	Dimethenamid	GC-TSD	BS2304
LOQ:	0.01 mg/kg		
Description	As for BS1988 above, but with an additional GC-MS confirmation step.		

Maize plants, straw, grain, cobs and soil

Bourry, Hertl and Karapally, 1993[Ref: 1993/11181]

Analytes:	Dimethenamid	GS-TSD	AM-0884-0193-1
LOQ:	0.01 mg/kg (soil: 0.005 mg/kg)		
Description	As for BS2304 above, but with additional explanations and comments to support use as an enforcement method (US EPA).		

Maize and soya bean plants, grain, straw

Greenhalgh, 1995b [Ref: 1995/5000229]

Analytes:	Dimethenamid	GC-TSD	XM-15
LOQ:	0.02 mg/kg		
Description	A modification of BS 2304, with samples extracted in larger quantities of methanol which is subsequently evaporated off and the use of smaller volumes of methanol:water (85:15) when eluting the analyte through the extraction columns.		

Maize forage, silage, grain, fodder

Smith, 1992 [Ref: 1992/12427]

Analytes:	Sulfonate metabolite (M27) of dimethenamid	HPLC-uv	AM-0868-0392-1
LOQ:	0.2 mg/kg (forage), 0.1 mg/kg (silage, fodder), 0.05 mg/kg (grain)		
Description	Samples blended with methanol:water (98:2) and filtered under vacuum, with filtrates extracted with hexane, acidified then chromatographed on a combination of strong cation/anion exchange columns before quantitation using HPLC (uv detection).		

Soya bean forage, silage, grain, fodder

Smith and Bade, 1991b [Ref: 1991/11841]

Analytes: Dimethenamid & oxalamide metabolite (M23) GC-MS AM-0850-0291-0

LOQ: 0.02 mg/kg

Description Samples extracted with methanol:water (98:2). Extracts diluted with water and partitioned with methylene chloride:ethyl ether (1:1) before concentration and treatment with diazomethane to methylate the oxalamide metabolite (M3). Clean-up by reversed phase C_{18} solid phase extraction columns. Separation and quantitation by GC using a mass selective detector.
Note: This method discontinued because of recovery variability.

Sugar beet tops, roots, maize plants, grain, straw

Fegert and Mackenroth, 1999 [Ref: 1999/10004]

Analytes: Dimethenamid GC-MS BASF 980/0

LOQ: 0.01 mg/kg

Description A modification of BS 2404, with extraction in methanol (rather than methanol:water) and the use of smaller sample sizes but with larger aliquots being taken through the clean-up procedure. Methanol rather than toluene was used in the final GC solution and GC-MS (ion trap) was used for separation and quantitation.

Animal commodities (muscle, fat, kidney, liver, eggs, milk)

Bourry and Hertl, 1992 [Ref: 1993/11481]

Analytes: Dimethenamid GC-TSD BS 3428

LOQ: 0.01 mg/kg

Description Samples extracted with acetonitrile, cleaned up by partitioning with pentane, reverse phaseC_{18} solid phase extraction column and partitioning between water and toluene and chromatography on a silica gel column using ethyl acetate:cyclohexane (2:8) elution. The eluate concentrated and dissolved in toluene for GC analysis with a thermionic specific detector (TSD).

The suitability of a multi-residue method for determining dimethenamid in maize plants and grain was tested by Weeren and Schmidt, 1995 [Ref: 1995/10127]. This method, a modification of DFG Method S 19, involved acetone:water (2:1) extraction, ethyl acetate:cyclohexane (1:1) partitioning, gel permeation and mini silica gel column cleanups and GC-MS analysis. The modification used in this study was the use of ethyl acetate:cyclohexane rather than dichloromethane in the clean-up partitioning step. The reported LOQ for dimethenamid was 0.01 mg/kg and mean recovery rates were 76–79%.

Table 19. Analytical recoveries for spiked dimethenamid, dimethenamid-P and metabolites in various substrates.

Commodity	Analyte	Spike conc, mg/kg	n	Recovery%		Method	Reference
				mean	range		
Maize forage	dimethenamid	0.2-0.5	7	140	96-185	AM-0840-0391-1	1991/11820
Maize silage	dimethenamid	0.1-0.5	4	138	118-155	AM-0840-0391-1	1991/11820
Maize grain	dimethenamid	0.1-0.5	4	166	142-197	AM-0840-0391-1	1991/11820
Maize fodder	dimethenamid	0.1-0.2	6	156	116-195	AM-0840-0391-1	1991/11820
Maize forage	oxalamide -M23	0.2-0.5	7	137	92-176	AM-0840-0391-1	1991/11820
Maize silage	oxalamide -M23	0.1-0.5	4	132	112-151	AM-0840-0391-1	1991/11820
Maize grain	oxalamide -M23	0.1-0.5	4	149	115-187	AM-0840-0391-1	1991/11820
Maize fodder	oxalamide -M23	0.1-0.2	6	130	104-167	AM-0840-0391-1	1991/11820

Commodity	Analyte	Spike conc, mg/kg	n	Recovery%		Method	Reference
				mean	range		
Maize plant	dimethenamid	0.01-0.6	8	101	84-126	BS 1988	1991/11840
Maize straw	dimethenamid	0.02-0.6	7	97	85-108	BS 1988	1991/11840
Maize grain, cob	dimethenamid	0.02-0.3	5	97	96-101	BS 1988	1991/11840
Maize plant	dimethenamid	0.01-0.6	25	104	79-137	BS 2304	1991/11824
Maize straw	dimethenamid	0.02-0.6	13	101	80-135	BS 2304	1991/11824
Maize grain, cob	dimethenamid	0.02-0.3	18	97	67-116	BS 2304	1991/11824
Maize grain, cob	dimethenamid	0.01-0.05	4	101	82-140	BS 2304	1991/11839
Maize fodder	dimethenamid	0.01-0.05	3	94	90-98	BS 2304	1991/11839
Soya beans	dimethenamid	0.1-0.5	4	91	89-93	BS 2304	1991/11839
Soya bean forage	dimethenamid	0.1-0.5	4	94	93-94	BS 2304	1991/11839
Maize plant	dimethenamid	0.01-0.6	25	104	79-137	BS 2304	1993/11181
Maize straw	dimethenamid	0.02-0l.6	13	101	80-135	BS 2304	1993/11181
Maize grain, cob	dimethenamid	0.02-0.3	18	97	67-116	BS 2304	1993/11181
Maize forage	dimethenamid	0.2-0.5	7	140	96-185	AM-0840-0790-0	1992/12400
Maize grain	dimethenamid	0.1-0.5	4	166	142-197	AM-0840-0790-0	1992/12400
Maize silage	dimethenamid	0.1-0.5	4	138	118-155	AM-0840-0790-0	1992/12400
Maize fodder	dimethenamid	0.1-0.2	6	156	116-195	AM-0840-0790-0	1992/12400
Maize forage	oxalamide -M23	0.2-0.5	7	137	92-176	AM-0840-0790-0	1992/12400
Maize grain	oxalamide -M23	0.1-0.5	4	149	115-187	AM-0840-0790-0	1992/12400
Maize silage	oxalamide -M23	0.1-0.5	4	132	112-151	AM-0840-0790-0	1992/12400
Maize fodder	oxalamide -M23	0.1-0.2	6	130	104-167	AM-0840-0790-0	1992/12400
Maize forage	dimethenamid	0.1-0.2	6	130	96-182	AM-0850-0291-0	1991/11841
Maize grain	dimethenamid	0.1	4	146	99-197	AM-0850-0291-0	1991/11841
Maize hay	dimethenamid	0.1	5	132	89-246	AM-0850-0291-0	1991/11841
Maize straw	dimethenamid	0.1	5	139	34-169	AM-0850-0291-0	1991/11841
Maize forage	oxalamide -M23	0.1-0.2	6	118	86-155	AM-0850-0291-0	1991/11841
Maize grain	oxalamide -M23	0.1	4	122	95-159	AM-0850-0291-0	1991/11841
Maize hay	oxalamide -M23	0.1	5	113	77-207	AM-0850-0291-0	1991/11841
Maize straw	oxalamide -M23	0.1	5	108	23-196	AM-0850-0291-0	1991/11841
Sugar beet tops	dimethenamid	0.01-1.0	15	82	65-102	BASF 980/0	1999/10004
Sugar beet roots	dimethenamid	0.01-1.0	15	90	79-106	BASF 980/0	1999/10004
Maize plant	dimethenamid	0.01-1.0	15	88	75-101	BASF 980/0	1999/10004
Maize grain	dimethenamid	0.01-1.0	15	90	79-100	BASF 980/0	1999/10004
Maize straw	dimethenamid	0.01-1.0	15	85	74-102	BASF 980/0	1999/10004
Maize plant	dimethenamid	0.01-0.1	4	79	68-90	DFG method S 19	1995/10127
Maize grain	dimethenamid	0.01-0.1	4	76	71-80	DFG method S 19	1995/10127

Commodity	Analyte	Spike conc, mg/kg	n	Recovery%		Method	Reference
				mean	range		
Maize forage	sulfonate -M27	0.05-0.5	21	72	42-96	AM-0868-0392-1	1992/12427
Maize silage	sulfonate -M27	0.05-0.5	14	72	57-97	AM-0868-0392-1	1992/12427
Maize grain	sulfonate -M27	0.05-0.5	13	77	66-104	AM-0868-0392-1	1992/12427
Maize fodder	sulfonate -M27	0.05-0.5	8	72	57-91	AM-0868-0392-1	1992/12427
Maize plant	dimethenamid-P	0.1-5.0	2	68	65-71	BASF 980/0	1999/10005
Maize grain	dimethenamid-P	0.05	1	69	69-69	BASF 980/0	1999/10005
Maize cob, husk	dimethenamid-P	1.0	1	78	78-78	BASF 980/0	1999/10005
Maize straw	dimethenamid-P	0.1	1	86	86-86	BASF 980/0	1999/10005
Sugar beet plant	dimethenamid-P	0.1-1.0	2	90	84-96	BASF 980/0	1999/10006
Sugar beet tops	dimethenamid-P	0.01-1.0	3	83	65-111	BASF 980/0	1999/10006
Sugar beet root	dimethenamid-P	0.01-1.0	3	70	69-72	BASF 980/0	1999/10006
Maize plant	dimethenamid-P	0.1-5.0	2	76	74-79	BASF 980/0	1999/10007
Maize grain	dimethenamid-P	0.01	1	78	78-78	BASF 980/0	1999/10007
Maize cob, husk	dimethenamid-P	0.1	2	70	68-72	BASF 980/0	1999/10007
Maize straw	dimethenamid-P	0.01-0.1	3	88	74-103	BASF 980/0	1999/10007
Bean plants	dimethenamid	0.02-0.4	15	80	72-88	XM-15B	1995/5000228
Beans, dry	dimethenamid	0.02-0.2	15	86	73-102	XM-15B	1995/5000228
Bean pods, straw	dimethenamid	0.02	5	108	99-120	XM-15B	1995/5000228
Meat	dimethenamid	0.012-0.12	3	98	92-104	BS 3428	1993/11481
Fat	dimethenamid	0.012-0.12	2	99	96-101	BS 3428	1993/11481
Liver	dimethenamid	0.012-0.12	2	86	72-100	BS 3428	1993/11481
Kidney	dimethenamid	0.012-0.1	2	92	88-97	BS 3428	1993/11481
Eggs	dimethenamid	0.011-0.11	3	92	80-101	BS 3428	1993/11481
Milk	dimethenamid	0.015-0.15	2	97	94-101	BS 3428	1993/11481

Stability of residues in stored analytical samples

The Meeting received information on the stability of residues of dimethenamid and metabolites in various maize, soya bean and onion substrates and in processed soya bean fractions stored at freezer temperatures for up to 21 months.

A study reported by Bade, 1992 [Ref: 1992/12400], investigated the storage stability of dimethenamid and its oxalamide metabolite in maize matrices under the normal frozen condition (-20 °C) used for field samples. In this study, control samples of maize forage, silage, fodder and grain were taken from a field residue trial conducted in Illinois (where analysis had demonstrated no measurable residues of dimethenamid or its oxalamide metabolite) and these samples were fortified at 0.5 mg/kg and stored in glass bottles inside a closed cardboard box in the freezer.

Samples were taken for analysis after 0, 3, 6, 12 and 21 months. Analytical methods used were AM-0840-0790-0 (to measure the parent compound and the oxalamide metabolite) and BS-2304 (measuring parent compound only) for the 21 month samples.

Table 20. Frozen storage stability of dimethenamid in maize matrices fortified at 0.5 mg/kg

Maize Matrix	Storage (Months)	Residue remaining (%[1]) after storage	
		Dimethenamid	Oxalamide metabolite
Forage	0	93	90
	3	104	118
	6	98	100
	12	83	76
	21	90	-
Silage	0	101	99
	3	84	88
	6	105	97
	12	60	58
	21	86	-
Grain	0	78	73
	3	74	76
	6	97	84
	12	92	94
	21	83	-
Fodder	0	82[2]	76[2]
	3	177[3]	113
	6	104	100
	12	67	75
	21	86	-

[1]) Corrected for procedural recovery, average of three replicates

[2]) Average of two replicates

[3]) High recovery not explained

In a study by Smith, 1992 [Ref: 1992/12389], the storage stability of dimethenamid and its sulfonate metabolite in soya bean matrices under frozen conditions was studied using field samples. Control samples of soya bean grain and forage were taken from a field residue trial conducted in North Carolina and half of these were fortified at 0.5 mg/kg. Both the fortified and control samples were stored in glass bottles, sealed and held in the dark at or below -16 °C.

Samples were taken for analysis after 0, 1, 3 and 16 months, the control samples being fortified immediately before analysis. Residues of dimethenamid and its sulfonate metabolite in the 16-month samples were measured using methods BS-2304 (measuring the parent compound) and AM-0868-0392-1 (measuring the sulfonate metabolite). The earlier samples (0, 1 and 3 months) were analysed using less reliable methods (AM-850-0291-0 and AM-0855-0491-0) which were rejected because of recovery variability.

Table 21. Frozen storage stability of dimethenamid in soya bean matrices fortified at 0.5 mg/kg

Soya bean Matrix	Storage (Months)	Residue remaining (%[1]) after storage	
		dimethenamid	Sulfonate metabolite
Forage[2]	Fresh[4]	75	78
	16	92	101
Grain[3]	Fresh[4]	108	74
	16	91	92

[1]) Corrected for procedural recovery

[2]) Average of three replicates

[3]) Average of two replicates
[4]) Samples fortified immediately before analysis

In a study by Laban, 1996 [Ref: 1996/11162], the stability of dimethenamid in stored soya bean processing fractions was studied by analysing stored samples of soya bean hulls, soap stock, crude lecithin and both crude and refined oil. Control samples were taken from processing studies conducted in Ohio and half of these were fortified at 0.1 mg/kg. Both the fortified and control samples were stored in glass bottles and held at or below -12 °C.

Samples were taken for analysis after 0, 1, 2 and 8 months, the control samples being fortified immediately before analysis. Residues of dimethenamid were measured using method AM-0884-0193-1.

Table 22. Frozen storage stability of dimethenamid in soya bean processing fractions fortified at 0.1 mg/kg

Processing fraction	Residue remaining (%[1]) after storage							
	0 months		1 month		2 months		8 months	
	Fresh[2]	Stored[3]	Fresh[2]	Stored[3]	Fresh[2]	Stored[3]	Fresh[2]	Stored[3]
Crude oil	75	89	97	100	101	107	89	87
Refined oil	145	103	58	74	124	100	112	85
Hulls	80	95	89	89	91	91	88	68
Crude lecithin	91[3]	75	104[3]	87	112[3]	103	62[3]	62
Soap stock	44	44	52	50	61	62	74	24

[1]) Corrected for procedural recovery
[2]) Samples fortified immediately before analysis. Average of two replicates
[3]) Average of three replicates

The storage stability of dimethenamid in onion bulbs (dry) under frozen conditions was studied by Corley, 1999 [Ref: 1999/5057]. Control samples of onion bulbs were taken from field residue trials conducted in USA with half of these fortified at 0.1 mg/kg. Both the fortified and control samples were stored in glass bottles, sealed and held in the dark at or below -20 °C.

Samples were taken for analysis after 9 months, the control samples being fortified immediately before analysis. Residues of dimethenamid were measured using method AM-884-0193-1.

In onion bulbs fortified immediately before analysis, a recovery rate of 109% was reported, with recoveries of 101%, 105% and 111% being reported in three samples stored for 9 months at or below -20 °C.

In spring onions, the storage stability of dimethenamid-P under frozen conditions was studied by Arsenovic, 2004 [Ref: 2004/7007453]. Control samples of spring onions were taken from field residue trials conducted in Canada and half of these were fortified at 0.1 mg/kg. Both the fortified and control samples were stored in glass bottles, sealed and held in the dark at or below -16 °C.

Samples were taken for analysis after 56 weeks (391 days), the control samples being fortified immediately before analysis. Residues of dimethenamid-P were measured using method AM-884-0193-1.

In spring onions fortified immediately before analysis, a recovery rate of 108% was reported, with recoveries of 96%, 98% and 105% being reported in the three samples stored for 391 days at or below -16 °C.

USE PATTERN

Information provided to the meeting from the manufacturer and Netherlands on registered uses of dimethenamid-P relating to the uses under consideration are summarised in the following table.

Table 23. Registered uses of dimethenamid-P (720 g ai/L EC formulations)

Crop	Country	Application		Max use/season		PHI (days)	Comments
		Method	kg ai/ha	No	kg ai/ha		
Beans (dry)	USA	pre-plant	0.63 – 1.1	1-2[1]	1.1	70 (beans)	
Beans (dry)	USA	pre-em	0.63 – 1.1	1-2[1]	1.1	70 (beans)	
Beans (dry)	USA	post-em	0.63 – 1.1	1-2[1]		70 (beans)	from 1-3 leaf stage not garbanzo beans, lentils
Chicory	Belgium	post-em	0.25 – 0.36	3	0.72		from 4-6 leaf stage
Fodder beet	Belgium	post-em	0.25 – 0.36	3	0.72		from 4-6 leaf stage
Fodder beet	Belgium	post-em	0.72	1			at 6-8 leaf stage
Fodder beet	Netherlands	post-em	0.22	3			from 2 leaf stage
Fodder beet	Netherlands	post-em	0.33	2			from 4 leaf stage
Fodder beet	Netherlands	post-em	0.65	1			
Garden beet	USA	post-em	0.63 – 1.1	1-2[1]	1.1	60	from 2-6 leaf stage
Garlic	USA	post-em	0.63 – 1.1	1-2[1]	1.1	30	from 2-leaf stage
Grasses (seed crops)	USA	post-em	0.73 – 1.1	1	1.1	no grazing, not for animal feed	
Horseradish	USA	post-em	0.63 – 1.1	1	1.1	40	from 2-8 leaf stage
Maize	Belgium	pre-em	1.0	1			
Maize	Belgium	post-em	1.0	1			at 3-4 leaf stage
Maize	France	pre-em	0.72 – 1.0	1		90	
Maize	Germany	pre-em	1.0				
Maize	Germany	post-em	1.0	1			up to 6-leaf stage
Maize	Greece	pre-plant	0.9-1.0				registration pending
Maize	Greece	pre-em	0.9-1.0				registration pending
Maize	Netherlands	pre-em	1.0	1			
Maize	Netherlands	post-em	1.0	1			at 2-6 leaf stage
Maize	Spain	pre-em	0.72 – 1.0				
Maize	Spain	post-em	0.72 – 1.0				
Maize	USA	pre-plant	0.63 – 1.1	1-2[1]	1.1	40 (forage)	
Maize	USA	pre-em	0.63 – 1.1	1-2[1]	1.1	40 (forage)	
Maize	USA	post-em	0.63 – 1.1	1-2[1]		40 (forage)	directed spray at lay-by (30-90 cm height)
Maize	USA	post-em	0.63 – 1.1	1-2[1]		40 (forage)	up to 30 cm height
Onions (bulb)	USA	post-em	0.63 – 1.1	1-2[3]	1.1	30	from crop 2-leaf stage
Peanut	USA	pre-plant	0.63 – 1.1	1-2[1]	1.1	80	
Peanut	USA	pre-em	0.63 – 1.1	1-2[1]	1.1	80	
Peanut	USA	post-em	0.63 – 1.1	1-2[1]	1.1	80	
Pop corn	USA	pre-plant	0.63 – 1.1	1-2[1]	1.1		
Pop corn	USA	pre-em	0.63 – 1.1	1-2[1]	1.1		
Pop corn	USA	post-em	0.63 – 1.1	1-2[1]			directed spray at lay-by (30-90 cm height)
Pop corn	USA	post-em	0.63 – 1.1	1-2[1]			
Potato	USA	pre-em	0.63 – 1.1	1	1.1	40	

Crop	Country	Application		Max use/season		PHI (days)	Comments
		Method	kg ai/ha	No	kg ai/ha		
Root & Tuber vegetables[2]	USA	pre-em	0.63 – 1.1	1	1.1	40	
Shallots	USA	post-em	0.63 – 1.1	1-2[3]	1.1	30	from crop 2-leaf stage
Sorghum	France	post-em	0.86	1		90	
Sorghum	USA	pre-plant	0.63 – 1.1	1-2[1]	1.1	60 (forage) 80 (grain, fodder)	
Sorghum	USA	pre-em	0.63 – 1.1	1-2[1]	1.1	60 (forage) 80 (grain, fodder)	
Sorghum	USA	post-em	0.63 – 1.1	1-2[1]	1.1	60 (forage) 80 (grain, fodder)	up to 30cm height
Soya bean	USA	pre-plant	0.63 – 1.1	1-2[1]	1.1	not for animal feed	
Soya bean	USA	pre-em	0.63 – 1.1	1-2[1]	1.1	not for animal feed	
Soya bean	USA	post-em	0.63 – 1.1	1-2[1]	1.1	not for animal feed	from 1-3 leaf stage
Spring onion	USA	post-em	0.63 – 1.1	1-2[1]	1.1	30	from crop 2-leaf stage registration pending
Sugar beet	Belgium	post-em	0.25 – 0.36	3	0.72		from 4-6 leaf stage
Sugar beet	Belgium	post-em	0.72	1			at 6-8 leaf stage
Sugar beet	Germany	post-em	0.65	1			at 6-8 leaf stage
Sugar beet	Netherlands	post-em	0.22	3			
Sugar beet	Netherlands	post-em	0.33	2			from 2-leaf stage
Sugar beet	Netherlands	post-em	0.65	1			from 4-leaf stage
Sugar beet	USA	post-em	0.63 – 1.1	1-2[1]	1.1	60	at 2-12 leaf stage
Sweet corn	France	pre-em	0.72 – 1.0	1		60	
Sweet corn	Germany	pre-em	1.0	1			up to 6 leaf stage
Sweet corn	USA	pre-plant	0.63 – 1.1	1-2[1]	1.1	50	
Sweet corn	USA	pre-em	0.63 – 1.1	1-2[1]	1.1	50	
Sweet corn	USA	post-em	0.63 – 1.1	1-2[1]		50	up to 30 cm height
Sweet potato	USA	pre-em	0.63 – 1.1	1	1.1	40	

'pre-plant' means broadcast spray followed by shallow soil incorporation before planting

'pre-em' means broadcast spray before crop emergence, without incorporation, provided rain or irrigation occurs soon after treatment

'post-em' means broadcast spray after the crop has emerged.

[1]) Split applications also recommended, generally involving pre-plant or pre-emergence treatment at 50-66% recommended rate and a pre-emergence or post-emergence treatment at 33-50% recommended rate, not closer than 14 days later

[2]) Root & Tuber vegetables: Arracacha, Arrowroot, Chinese artichokes, Jerusalem artichokes, Edible canna, Bitter cassava, Sweet cassava, Root chayote, Chufa, Dasheen, Ginger, leren, Tanier, Turmeric, Yam bean, True yam

RESIDUES RESULTING FROM SUPERVISED TRIALS

The Meeting received information on supervised field trials involving dimethenamid or dimethenamid-P for the following crops.

Table 24	Onion, bulb	dimethenamid	USA
Table 25	Spring onion	dimethenamid-P	Canada, USA
Tables 26-27	Sweetcorn	dimethenamid	Canada, France, USA
Tables 28-30	Beans, dry	dimethenamid	Canada, USA
Tables 31-39	Soya bean	dimethenamid	Canada, USA
Tables 40-42	Potato	dimethenamid-P	USA

Tables 43-44	Sugar beet	dimethenamid-P	France, Germany, Netherlands, USA
Table 45-46	Sugar beet	dimethenamid	France, Germany, Netherlands, Switzerland
Tables 47-55	Maize	dimethenamid	Belgium, Canada, France, Germany, Italy, Greece, Netherlands, Spain, Switzerland, USA
Table 56	Maize	dimethenamid-P	Belgium, France, Germany, Italy, Netherlands
Table 57-59	Maize	dimethenamid	USA
Tables 60-61	Sorghum	dimethenamid	USA
Table 62-63	Peanuts	dimethenamid	USA
Tables 64-66	Bean forage, fodder	dimethenamid	Canada, USA
Tables 67-68	Peanut forage, fodder	dimethenamid	USA
Tables 69-77	Soya bean forage, fodder	dimethenamid	Canada, USA
Table 78	Grasses forage, fodder	dimethenamid-P	USA
Tables 79-86	Maize forage, fodder	dimethenamid	Belgium, Canada, France, Germany, Italy, Netherlands, Spain, Switzerland, USA
Table 87	Maize forage, fodder	dimethenamid-P	Belgium, France, Germany, Italy, Netherlands,
Tables 88-90	Maize forage, fodder	dimethenamid	USA
Tables 91-92	Sorghum forage, fodder	dimethenamid	USA
Tables 93-94	Sugar beet leaves, tops	dimethenamid-P	France, Germany, Netherlands, USA
Tables 95-96	Sugar beet leaves, tops	dimethenamid	France, Germany, Netherlands, Switzerland

Trials were well documented with laboratory and field reports. Laboratory reports included method validation including procedural recoveries with spiking at residue levels similar to those occurring in samples from the supervised trials. Dates of analyses or duration of residue sample storage were also provided. Although trials included control plots, no control data are recorded in the tables because no residues in control samples exceeded the LOQ. Residue data are recorded unadjusted for recovery.

Results from replicated field plots are presented as individual values. Results from replicate field samples and replicate laboratory samples are presented as the means. When residues were not detected they are shown as below the LOQ (e.g. < 0.01 mg/kg). Residues and application rates have generally been rounded to two significant figures or, for residues near the LOQ, to one significant figure. Residue values from the trials conducted according to maximum GAP have been used for the estimation of maximum residue levels. These results are <u>double underlined</u>.

Intervals of freezer storage between sampling and analysis were recorded for most trials and were covered by the conditions of the freezer storage stability studies in most cases. Where extended storage periods were reported, these have been noted.

Onion, bulb

In trials on dry bulb onions, a single post emergence application of dimethenamid was applied at rates of 1.64–1.75 kg ai/ha to onion plants, using from 170–250 litres of spray mix/ha. Treatments were made to different plots, about 15 days apart to plants at growth stages ranging from the 3-leaf stage up to the start of bulbing. Mature bulbs (without tops) were harvested between 30 and 45 days later and analysed using Method AM-0884-0193-1. The limit of quantification of this method was 0.01 mg/kg and the recovery rate was 104 ± 8% (n=26) at fortification levels of 0.01–1.0 mg/kg.

GAPs for dimethenamid-P on onions, bulb and related crops are:

	Country	Application		Max use/season		PHI (days)	Comments
		Method	kg ai/ha	No	kg ai/ha		
Onion, bulb	USA	post-em	0.63 – 1.1	1-2[1]	1.1	30	from crop 2-leaf stage
Garlic	USA	post-em	0.63 – 1.1	1-2[1]	1.1	30	from crop 2-leaf stage
Shallot	USA	post-em	0.63 – 1.1	1-2[1]	1.1	30	from crop 2-leaf stage

[1]) Split applications also recommended, generally involving post-emergence treatments at 50-66% recommended rate and 33-50% rate not closer than 14 days later.

Table 24. Residue data summary of supervised trials on onion, bulb in USA, involving a single post-emergence treatment with dimethenamid.

ONION, BULB Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, California, 1997 (Yula)	EC720	1.67	Post-em	28	Bulbs, no tops	≤ 0.01	1999/5057
USA, California, 1998 (Colossal)	EC 720	1.7	Post-em	28	Bulbs, no tops	≤ 0.01	1999/5057
USA, Washington, 1997 (Fiesta)	EC 720	1.64	Post-em	29	Bulbs, no tops	≤ 0.01	1999/5057
USA, Wisconsin, 1997 (Arsenal)	EC 720	1.66	Post-em	29	Bulbs, no tops	≤ 0.01	1999/5057
USA, Texas, 1998 (Texas Giano 1015Y)	EC 720	1. 7	Post-em	30	Bulbs, no tops	≤ 0.01	1999/5057
USA, Michigan, 1997 (Hustler)	EC 720	1.64	Post-em	30	Bulbs, no tops	≤ 0.01	1999/5057
USA, New York, 1997 (Voyager F1)	EC 720	1.67	Post-em	31	Bulbs, no tops	≤ 0.01	1999/5057
USA, Oregon, 1997 (Santos F1)	EC 720	1.72	Post-em	31	Bulbs, no tops	≤ 0.01	1999/5057
USA, Washington, 1997 (Fiesta)	EC 720	1.64	Post-em	43	Bulbs, no tops	< 0.01	1999/5057
USA, California, 1998 (Colossal)	EC 720	1.7	Post-em	43	Bulbs, no tops	< 0.01	1999/5057
USA, Michigan, 1997 (Hustler)	EC 720	1.65	Post-em	44	Bulbs, no tops	< 0.01	1999/5057
USA, California, 1997 (Yula)	EC720	1.66	Post-em	44	Bulbs, no tops	< 0.01	1999/5057
USA, Wisconsin, 1997 (Arsenal)	EC 720	1.74	Post-em	44	Bulbs, no tops	< 0.01	1999/5057
USA, Texas, 1998 (Texas Giano 1015Y)	EC 720	1. 7	Post-em	45	Bulbs, no tops	< 0.01	1999/5057
USA, New York, 1997 (Voyager F1)	EC 720	1.67	Post-em	45	Bulbs, no tops	< 0.01	1999/5057
USA, Oregon, 1997 (Santos F1)	EC 720	1.75	Post-em	45	Bulbs, no tops	< 0.01	1999/5057

'Post-em' = post-emergence broadcast spray

Spring onion

In trials on green (spring) onions, dimethenamid-P was applied as single post emergence applications at rates of 1.0–1.12 kg ai/ha to onion plants ranging in height from 8–50 cm, using 240–350 litres of spray mix/ha. Treatments were made to single replicate plots and whole plants, without roots, were harvested between 20 and 30 days later. Samples were analysed using Method AM-0884-0193-1. The

limit of quantification of this method was 0.01 mg/kg and the recovery rate was 99 ± 5% (n=7) at fortification levels of 0.01 and 0.1 mg/kg.

No GAP information was available to the meeting for dimethenamid-P on spring onions although it was noted that an emergency authorisation had been issued by US EPA in 2005.

Table 25. Residue data summary of supervised trials on spring onions in Canada and USA, involving a single post-emergence treatment with dimethenamid-P.

SPRING ONION Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Georgia, 2001 (Granex 33)	EC 720	1.12	Post-em	29	Plant	< 0.01	2004/7007453
USA, Florida, 2001 (White Portugal)	EC 720	1.07	Post-em	28	Plant	< 0.01	2004/7007453
Canada, Quebec, 2001 (White Spear)	EC 720	1.12	Post-em	32	Plant	< 0.01	2004/7007453
Canada, Ontario, 2001 (Regiment)	EC 720	1.0	Post-em	30	Plant	< 0.01	2004/7007453
USA, Texas, 2001 (El Toro)	EC 720	1.11	Post-em	30	Plant	< 0.01	2004/7007453
Canada, B Columbia, 2001 (Kincho)	EC 720	1.19	Post-em	20 29	Plant	< 0.01 < 0.01	2004/7007453

'Post-em' = post-emergence broadcast spray

'Plant' = entire plant without roots, after trimming dead leaves, sampled at normal commercial harvest time

Sweet corn

In trials on sweet corn, dimethenamid was applied at rates of 1.3–2.6 kg ai/ha to separate single-replicate plots, either as a pre-emergence broadcast treatment (0-6 days after planting) or as a post-emergence treatment when the crop was about 20 cm in height or at the 2-leaf stage, using from 170 to 250 litres of spray mix/ha in the North American trials and 400–420 litres/ha in the French trials.

In the Canadian trials, whole plants (without roots) were sampled about 40–54 days after treatment and in all trials, whole plants (without roots) were harvested at maturity, with the cobs (without husks) or the kernels, as well as the remaining plant parts being analysed using Method BS2304 in the French trials, a modified version of BS2304 (XM-15) in the Canadian trials and Method AM-0884-0193-1 in the USA trials. The limit of quantification in the USA and French trials was 0.01 mg/kg, while the modified BS2304 method used in the Canadian trials reported a higher LOQ of 0.02 mg/kg. Recovery rates ranged from 88% to 99% in the North American trials and 115–123% in the French trials.

GAPs for dimethenamid-P on sweet corn are:

Country	Application		Max use/season		PHI (days)	Comments
	Method	kg ai/ha	No	kg ai/ha		
France	pre-em	0.72 – 1.0	1		60	
Germany	pre-em	1.0	1			up to 6-leaf stage
USA	pre-plant	0.63 – 1.1	1-2[1]	1.1	50	
USA	pre-em	0.63 – 1.1	1-2[1]	1.1	50	
USA	post-em	0.63 – 1.1	1-2[1]		50	up to 30 cm height

[1]) Split applications also recommended, generally involving pre-plant or pre-emergence treatment at 50-66% recommended rate and a pre-emergence or post-emergence treatment at 33-50% recommended rate, not closer than 14 days later

Table 26. Residue data summary of supervised trials on sweet corn in Canada, France and USA, involving a single pre-emergence treatment with dimethenamid.

SWEET CORN Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Canada, Ontario, 1994 (Patton)	EC 900	1.3	Pre-em	40 54 76	Plant Straw Kernals	< 0.02 < 0.02 < 0.02 < 0.02	1995/500029
Canada, Ontario, 1994 (Patton)	EC 900	2.6	Pre-em	40 54 76	Plant Straw Kernals	< 0.02 < 0.02 < 0.02 < 0.02	1995/500029
Canada, Ontario, 1994 (Sir Galahad)	EC 900	1.3	Pre-em	40 54 84	Plant Straw Kernals	< 0.02 < 0.02 < 0.02 < 0.02	1990/11093
Canada, Ontario, 1994 (Sir Galahad)	EC 900	2.6	Pre-em	40 54 84	Plant Straw Kernals	< 0.02 < 0.02 < 0.02 < 0.02	1990/11093
France, Apilly, 1992 (not specified)	EC 900	1.53	Pre-em	112	Straw Cob	< 0.01 < 0.01	1995/10132
France, Taillebourg, 1992 (Jubile)	EC 900	1.46	Pre-em	92	Straw Cob	< 0.01 < 0.01	1995/10132
USA, California, 1994 (Silverado)	EC 900	1.68	Pre-em	92	Straw Cob	< 0.01 < 0.01	1995/10454
USA, Florida, 1994 (Silver Queen)	EC 900	1.68	Pre-em	70	Straw Cob	< 0.01 < 0.01	1995/10454
USA, Idaho, 1994 (Snowbelle)	EC 900	1.68	Pre-em	98	Straw Cob	< 0.01 < 0.01	1995/10454
USA, Illinois, 1994 (Calico Belle)	EC 900	1.68	Pre-em	73	Straw Cob	< 0.01 < 0.01	1995/10454
USA, Minnesota, 1994 (Tender Treat)	EC 900	1.68	Pre-em	95	Straw Cob	< 0.01 < 0.01	1995/10454
USA, Minnesota, 1994 (Tender Treat)	EC 900	1.68	Pre-em	97	Straw Cob	< 0.01 < 0.01	1995/10454
USA, Minnesota, 1994 (Tender Treat)	EC 900	1.68	Pre-em	97	Straw Cob	< 0.01 < 0.01	1995/10454
USA, New York, 1994 (Crusader)	EC 900	1.68	Pre-em	80	Straw Cob	< 0.01 < 0.01	1995/10454
USA, New York, 1994 (Northrup King 199)	EC 900	1.68	Pre-em	90	Straw Cob	< 0.01 < 0.01	1995/10454
USA, Oregon, 1994 (Jubilee)	EC 900	1.68	Pre-em	86	Straw Cob	< 0.01 < 0.01	1995/10454
USA, Pennsylvania, 1994 (not specified)	EC 900	1.68	Pre-em	74	Straw Cob	< 0.01 < 0.01	1995/10454
USA, Washington, 1994 (Golden Jubilee)	EC 900	1.68	Pre-em	72	Straw Cob	< 0.01 < 0.01	1995/10454

SWEET CORN Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Wisconsin, 1994 (Merit)	EC 900	1.68	Pre-em	74	Straw Cobs	< 0.01 ≤ 0.01	1995/10454
USA, Wisconsin, 1994 (Merit)	EC 900	1.68	Pre-em	88	Straw Cob	< 0.01 ≤ 0.01	1995/10454

'Pre-em' = pre-emergence broadcast spray

'Plant' = the entire plant without roots

'Straw' = the rest of the plant (including the husks but without roots), after cobs have been removed for analysis.

'Cob' = kernels plus cob, without husk

Table 27. Residue data summary of supervised trials on sweetcorn in Canada and USA, involving a single post-emergence treatment with dimethenamid.

SWEET CORN Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Canada, Ontario, 1994 (Patton)	EC 900	1.3	Post-em	32 46 68	Plant Straw Kernals	< 0.02 < 0.02 < 0.02 < 0.02	1995/500029
Canada, Ontario, 1994 (Patton)	EC 900	2.6	Post-em	32 46 68	Plant Straw Kernals	< 0.02 < 0.02 < 0.02 < 0.02	1995/500029
Canada, Ontario, 1994 (Sir Galahad)	EC 900	1.3	Post-em	32 46 76	Plant Straw Kernals	< 0.02 < 0.02 < 0.02 < 0.02	1990/11093
Canada, Ontario, 1994 (Sir Galahad)	EC 900	2.6	Post-em	32 46 76	Plant Straw Kernals	< 0.02 < 0.02 < 0.02 < 0.02	1990/11093
USA, California, 1994 (Silverado)	EC 900	1.68	Post-em	69	Straw Cob	< 0.01 < 0.01	1995/10454
USA, Florida, 1994 (Silver Queen)	EC 900	1.68	Post-em	56	Straw Cob	< 0.01 ≤ 0.01	1995/10454
USA, Idaho, 1994 (Snowbelle)	EC 900	1.68	Post-em	74	Straw Cob	< 0.01 < 0.01	1995/10454
USA, Illinois, 1994 (Calico Belle)	EC 900	1.68	Post-em	54	Straw Cob	< 0.01 ≤ 0.01	1995/10454
USA, Minnesota, 1994 (Tender Treat)	EC 900	1.68	Post-em	67	Straw Cob	< 0.01 < 0.01	1995/10454
USA, Minnesota, 1994 (Tender Treat)	EC 900	1.68	Post-em	67	Straw Cob	< 0.01 < 0.01	1995/10454
USA, Minnesota, 1994 (Tender Treat)	EC 900	1.68	Post-em	67	Straw Cob	< 0.01 < 0.01	1995/10454
USA, New York, 1994 (Crusader)	EC 900	1.68	Post-em	60	Straw Cob	< 0.01 ≤ 0.01	1995/10454
USA, New York, 1994 (Northrup King 199)	EC 900	1.68	Post-em	61	Straw Cob	< 0.01 ≤ 0.01	1995/10454

SWEET CORN Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Oregon, 1994 (Jubilee)	EC 900	1.68	Post-em	61	Straw Cob	< 0.01 < 0.01	1995/10454
USA, Pennsylvania, 1994 (not specified)	EC 900	1.68	Post-em	51	Straw Cob	< 0.01 < 0.01	1995/10454
USA, Washington, 1994 (Golden Jubilee)	EC 900	1.68	Post-em	32	Straw Cob	< 0.01 < 0.01	1995/10454
USA, Wisconsin, 1994 (Merit)	EC 900	1.68	Post-em	49	Straw Cob	< 0.01 < 0.01	1995/10454
USA, Wisconsin, 1994 (Merit)	EC 900	1.68	Post-em	71	Straw Cob	< 0.01 < 0.01	1995/10454

'Post-em' = post-emergence broadcast spray

'Plant' = entire plant without roots

'Straw' = the rest of the plant, including husks but without roots, after cobs have been removed for analysis

'Cob' = kernels plus cob, without husk

Beans, dry

In trials on a range of dry bean varieties, dimethenamid was applied at rates of 1.3–2.7 kg ai/ha to separate single-replicate plots (USA trials) or 4 × replicate plots (Canada) as single pre-plant broadcast sprays (followed by shallow soil incorporation) up to 3 days before planting, pre-emergence broadcast sprays, generally within 5 days after planting or post-emergence broadcast sprays between 20 and 40 days after planting, using 160–250 litres of spray mix/ha.

Whole plants (without roots) were sampled 1-2 months after planting (at about the 6-leaf stage), and again about a month later (just before senescence) with mature beans and straw also being sampled when the crops were threshed. In the USA trials, Method AM-0884-0193-1 was used to measure residues of dimethenamid, with an LOQ of 0.01 mg/kg and recovery rates of 97 ± 15% (n=7) for whole plants, 85 ± 4% (n = 4) for beans and 83 ± 9% (n=4) for straw at a fortification level of 0.01 mg/kg. Method XM-15B was used in the Canadian trials, with an LOQ of 0.02 mg/kg and recovery rates of 84 ± 9% (n=12) for whole plants, 101 ± 15% (n = 8) for beans and 98 ± 11% (n=8) for straw at fortification levels of 0.02-0.4 mg/kg.

GAPs for dimethenamid-P on beans, dry are:

Country	Application		Max use/season		PHI (days)	Comments
	Method	kg ai/ha	No	kg ai/ha		
USA	pre-plant	0.63 – 1.1	1-2[1]	1.1	70 (beans)	
USA	pre-em	0.63 – 1.1	1-2[1]	1.1	70 (beans)	
USA	post-em	0.63 – 1.1	1-2[1]		70 (beans)	from 1-3 leaf stage not garbanzo beans, lentils

[1]) Split applications also recommended, generally involving pre-plant or pre-emergence treatment at 50-66% recommended rate and a pre-emergence or post-emergence treatment at 33-50% recommended rate, not closer than 14 days later

Table 28. Residue data summary of supervised trials on beans, dry in Canada and USA, involving a single pre-plant treatment with dimethenamid.

BEANS, DRY Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				

BEANS, DRY Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Canada, Ontario, 1994 (OAC Gryphon) White beans	EC 900	1.29	Pre-plant	113	Beans	< 0.02 (4)	1995/500029
Canada, Ontario, 1994 (Stinger) White beans	EC 900	1.33	Pre-plant	108	Beans	< 0.02 (4)	1990/11093
USA, California, 1994 (Yolano Pink)	EC 900	1.68	Pre-plant	93	Beans	< 0.01	1995/10509
Canada, Ontario, 1994 (Stinger) White beans	EC 900	2.63	Pre-plant	108	Beans	< 0.02 (4)	1990/11093
Canada, Ontario, 1994 (OAC Gryphon) White beans	EC 900	2.66	Pre-plant	113	Beans	< 0.02 (4)	1995/500029

'Pre-plant' = broadcast spray and shallow soil incorporation before planting the crop

Table 29. Residue data summary of supervised trials on beans, dry in Canada and USA, involving a single pre-emergence treatment with dimethenamid.

BEANS, DRY Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Canada, Ontario, 1994 (OAC Gryphon) White beans	EC 900	1.27	Pre-em	105	Beans	< 0.02 (4)	1995/500029
Canada, Ontario, 1994 (Stinger) White beans	EC 900	1.29	Pre-em	102	Beans	< 0.02 (4)	1990/11093
USA, Colorado, 1994 (Bill Z) Pinto beans	EC 900	1.68	Pre-em	101	Beans	< 0.01	1995/10509
USA, Idaho, 1994 (Topaz) Pinto beans	EC 900	1.68	Pre-em	133	Beans	< 0.01	1995/10509
USA, Michigan, 1994 (Midland Navy) Navy beans	EC 900	1.68	Pre-em	99	Beans	< 0.01	1995/10509
USA, Michigan, 1994 (not specified)	EC 900	1.68	Pre-em	124	Beans	< 0.01	1995/10509
USA, Minnesota, 1994 (Upland) Navy beans	EC 900	1.68	Pre-em	116	Beans	< 0.01	1995/10509
USA, Nebraska, 1994 (Marquis)	EC 900	1.68	Pre-em	97	Beans	< 0.01	1995/10509

BEANS, DRY Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Nebraska, 1994 (not specified)	EC 900	1.68	Pre-em	102	Beans	< 0.01	1995/10509
USA, New York, 1994 (Gold Seal Horizon Light)	EC 900	1.68	Pre-em	93	Beans	< 0.01	1995/10509 air dried 6 days before threshing
USA, Nth Dakota, 1994 (Topaz) Pinto beans	EC 900	1.68	Pre-em	120	Beans	< 0.01	1995/10509
USA, Nth Dakota, 1994 (Topaz) Pinto beans	EC 900	1.68	Pre-em	119	Beans	< 0.01	1995/10509
USA, Nth Dakota, 1994 (Upland) Navy beans	EC 900	1.68	Pre-em	122	Beans	< 0.01	1995/10509
USA, Washington, 1994 (Brewer) Lentils	EC 900	1.68	Pre-em	76	Beans	< 0.01	1995/10509
USA, Wyoming, 1994 (Nodak) Pinto beans	EC 900	1.68	Pre-em	99	Beans	< 0.01	1995/10509
Canada, Ontario, 1994 (OAC Gryphon) White beans	EC 900	2.53	Pre-em	105	Beans	< 0.02 (4)	1995/500029
Canada, Ontario, 1994 (Stinger) White beans	EC 900	2.63	Pre-em	102	Beans	< 0.02 (4)	1990/11093

'Pre-em' = pre-emergence broadcast spray

Table 30. Residue data summary of supervised trials on beans, dry in USA, involving a single post-emergence treatment with dimethenamid.

BEANS, DRY Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, California, 1994 (Yolano Pink)	EC 900	1.68	Post-em	83	Beans	< 0.01	1995/10509
USA, Colorado, 1994 (Bill Z) Pinto beans	EC 900	1.68	Post-em	76	Beans	< 0.01	1995/10509
USA, Idaho, 1994 (Topaz) Pinto beans	EC 900	1.68	Post-em	129	Beans	< 0.01	1995/10509

BEANS, DRY Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Michigan, 1994 (Midland Navy) Navy beans	EC 900	1.68	Post-em	78	Beans	≤ 0.01	1995/10509
USA, Michigan, 1994 (not specified)	EC 900	1.68	Post-em	97	Beans	< 0.01	1995/10509
USA, Minnesota, 1994 (Upland) Navy beans	EC 900	1.68	Post-em	73	Beans	≤ 0.01	1995/10509
USA, Nebraska, 1994 (Marquis)	EC 900	1.68	Post-em	77	Beans	≤ 0.01	1995/10509
USA, Nebraska, 1994 (not specified)	EC 900	1.68	Post-em	84	Beans	≤ 0.01	1995/10509
USA, New York, 1994 (Gold Seal Horizon Light)	EC 900	1.68	Post-em	73	Beans	≤ 0.01	1995/10509 air dried 6 days before threshing
USA, Nth Dakota, 1994 (Topaz) Pinto beans	EC 900	1.68	Post-em	94	Beans	< 0.01	1995/10509
USA, Nth Dakota, 1994 (Topaz) Pinto beans	EC 900	1.68	Post-em	93	Beans	< 0.01	1995/10509
USA, Nth Dakota, 1994 (Upland) Navy beans	EC 900	1.68	Post-em 20cm height	96	Beans	< 0.01	1995/10509
USA, Washington, 1994 (Brewer) Lentils	EC 900	1.68	Post-em 20cm height	65	Beans	≤ 0.01	1995/10509
USA, Wyoming, 1994 (Nodak) Pinto beans	EC 900	1.68	Post-em	79	Beans	≤ 0.01	1995/10509

'Post-em' = post-emergence broadcast spray

Soya beans

In trials in Canada and USA, conducted between 1991 and 1993, dimethenamid was applied at rates of between 0.75 kg ai/ha and 3.0kg ai/ha in the Canadian trials and 1.68 kg ai/ha in the USA trials to separate single-replicate plots (USA trials) or 4× replicate plots (Canada) as single pre-plant broadcast sprays, followed by shallow soil incorporation, up to 3 days before planting, single pre-emergence broadcast sprays, generally within 5 days after planting (up to 19 days in one Canadian trial) or single post-emergence broadcast sprays when the plants were at the 2-4 leaf stage (up to 40 days after planting).

Whole plants (without roots) were sampled at about the 6-trifoliate leaf stage (as forage) and again just before senescence (as hay) with mature beans and straw also being sampled when the crops were harvested, in most trials this being by combine harvester. In the USA trials, samples were analysed using Method AM-0884-019 3-1, with an LOQ of 0.01 mg/kg and recovery rates of 94 ±

18% (n=14) for whole plants, 91 ± 20% (n=7) for beans and 85 ± 15% (n=7) for straw at a fortification level of 0.01 mg/kg. Samples from the Canadian trials were analysed using either Method BS2304 (LOQ 0.01 mg/kg) or AM-0884-0193-1 (LOQ 0.02 mg/kg). In these studies, Method BS2304 reported an average recovery rate of 96 ± 14% n=28 at fortification levels of 0.01-0.1 mg/kg while the recovery rates for Method AM-0884-0193-1 were 85 ± 10% (n=9) for whole plants, 96 ± 13% (n=9) for beans and 95 ± 8% (n=9) for straw at fortification levels of 0.02-0.5 mg/kg.

GAPs for dimethenamid-P on soya beans are:

Country	Application		Max use/season		PHI (days)	Comments
	Method	kg ai/ha	No	kg ai/ha		
USA	pre-plant	0.63 – 1.1	1-2[1]	1.1	not for animal feed	
USA	pre-em	0.63 – 1.1	1-2[1]	1.1	not for animal feed	
USA	post-em	0.63 – 1.1	1-2[1]	1.1	not for animal feed	from 1-3 leaf stage

[1]) Split applications also recommended, generally involving pre-plant or pre-emergence treatment at 50-66% recommended rate and a pre-emergence or post-emergence treatment at 33-50% recommended rate, not closer than 14 days later.

Table 31. Residue data summary of supervised trials on soya beans in Canada and USA, involving a single pre-plant treatment with dimethenamid.

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Canada, Ontario, 1992 (Not stated)	EC 900	0.75	Pre-plant	162	Beans	< 0.01 (4)	1993/5000022
Canada, Ontario, 1991 (Pioneer 9061)	EC 900	1.25	Pre-plant	140	Beans	≤ 0.01 (4)	1993/5000022
Canada, Ontario, 1992 (Not stated)	EC 900	1.5	Pre-plant	162	Beans	≤ 0.01 (4)	1993/5000022
USA, Illinois, 1992 (Northrup King 523-12)	EC 900	1.68	Pre-plant	114	Beans	≤ 0.01	1993/11796
USA, Illinois, 1992 (S28-18)	EC 900	1.68	Pre-plant	160	Beans	≤ 0.01	1993/11796
USA, Indiana, 1992 (Williams 82)	EC 900	1.68	Pre-plant	134	Beans	≤ 0.01	1993/11796
USA, Iowa, 1992 (Stine 2255	EC 900	1.68	Pre-plant	137	Beans	≤ 0.01	1993/11796
USA, Iowa, 1992 (Stine 2255)	EC 900	1.68	Pre-plant	145	Beans	≤ 0.01	1993/11796
USA, Mississippi, 1992 (Hutcheson)	EC 900	1.68	Pre-plant	114	Beans	≤ 0.01	1993/11796
USA, Missouri, 1992 (Williams 82)	EC 900	1.68	Pre-plant	140	Beans	≤ 0.01	1993/11796
Canada, Ontario, 1991 (Pioneer 9061)	EC 900	2.5	Pre-plant	140	Beans	≤ 0.01 (4)	1993/5000022
Canada, Ontario, 1992 (Not stated)	EC 900	3.0	Pre-plant	162	Beans	≤ 0.01 (4)	1993/5000022

Pre-plant = soil applied and shallow rotary hoe incorporation to 5-8cm just before planting

Table 32. Residue data summary of supervised trials on soya beans in Canada and USA, involving a single pre-emergence treatment with dimethenamid.

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Canada, Ontario, 1991 (Not stated)	EC 900	0.75	Pre-em	155	Beans	< 0.01 (4)	1993/5000022
Canada, Ontario, 1992 (King Grain 41)	EC 900	0.76	Pre-em	169	Beans	< 0.02 (4)	1997/5790
Canada, Ontario, 1992 (King Grain 60)	EC 900	0.76	Pre-em	169	Beans	< 0.02 (4)	1997/5790
Canada, Ontario, 1991 (Not stated)	EC 900	1.25	Pre-em	120	Beans	≤ 0.01 (4)	1993/5000022
Canada, Ontario, 1991 (Not stated)	EC 900	1.25	Pre-em	132	Beans	≤ 0.01 (4)	1993/5000022
Canada, Ontario, 1992 (King Grain 41)	EC 900	1.5	Pre-em	169	Beans	≤ 0.02 (4)	1997/5790
Canada, Ontario, 1992 (King Grain 60)	EC 900	1.5	Pre-em	169	Beans	≤ 0.02 (4)	1997/5790
Canada, Ontario, 1991 (Not stated)	EC 900	1.5	Pre-em	155	Beans	≤ 0.01 (4)	1993/5000022
USA, Illinois, 1992 (Northrup King 523-12)	EC 900	1.68	Pre-em	114	Beans	≤ 0.01	1993/11796
USA, Illinois, 1992 (S28-18)	EC 900	1.68	Pre-em	160	Beans	≤ 0.01	1993/11796
USA, Indiana, 1992 (Williams 82)	EC 900	1.68	Pre-em	134	Beans	≤ 0.01	1993/11796
USA, Iowa, 1992 (Stine 2255	EC 900	1.68	Pre-em	137	Beans	≤ 0.01	1993/11796
USA, Iowa, 1992 (Stine 2255)	EC 900	1.68	Pre-em	145	Beans	≤ 0.01	1993/11796
USA, Mississippi, 1992 (Hutcheson)	EC 900	1.68	Pre-em	111	Beans	≤ 0.01	1993/11796
USA, Missouri, 1992 (Williams 82)	EC 900	1.68	Pre-em	140	Beans	≤ 0.01	1993/11796
Canada, Ontario, 1992 (King Grain 41)	EC 900	2.9	Pre-em	169	Beans	≤ 0.02 (4)	1997/5790
Canada, Ontario, 1992 (King Grain 60)	EC 900	2.9	Pre-em	169	Beans	≤ 0.02 (4)	1997/5790
Canada, Ontario, 1991 (Not stated)	EC 900	3.0	Pre-em	155	Beans	≤ 0.01 (4)	1993/5000022

Pre-em = pre-emergence broadcast spray application

Table 33. Residue data summary of supervised trials on soya beans in USA, involving a single post-emergence treatment with dimethenamid.

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Illinois, 1992 (Northrup King 523-12)	EC 900	1.68	Post-em	99	Beans	≤ 0.01	1993/11796
USA, Illinois, 1992 (S28-18)	EC 900	1.68	Post-em	142	Beans	≤ 0.01	1993/11796

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Illinois, 1993 (Pioneer 9273)	EC 900	1.68	Post-em	108	Beans	≤ 0.01	1994/11282
USA, Indiana, 1992 (Williams 82)	EC 900	1.68	Post-em	127	Beans	≤ 0.01	1993/11796
USA, Iowa, 1992 (Stine 2255	EC 900	1.68	Post-em	119	Beans	≤ 0.01	1993/11796
USA, Iowa, 1992 (Stine 2255)	EC 900	1.68	Post-em	119	Beans	≤ 0.01	1993/11796
USA, Kansas, 1993 (Terra Cycle)	EC 900	1.68	Post-em	140	Beans	≤ 0.01	1994/11282
USA, Louisiana, 1993 (HSC B2J)	EC 900	1.68	Post-em	90	Beans	≤ 0.01	1994/11282
USA, Minnesota, 1993 (Evans)	EC 900	1.68	Post-em	107	Beans	≤ 0.01	1994/11282
USA, Mississippi, 1992 (Hutcheson)	EC 900	1.68	Post-em	99	Beans	≤ 0.01	1993/11796
USA, Missouri, 1992 (Williams 82)	EC 900	1.68	Post-em	114	Beans	≤ 0.01	1993/11796
USA, North Carolina, 1993 (Brim)	EC 900	1.68	Post-em	163	Beans	≤ 0.01	1994/11282
USA, Ohio, 1993 (Madison Seed GL2910)	EC 900	1.68	Post-em	90	Beans	≤ 0.01	1994/11282
USA, South Dakota, 1993 (Corsoy 79)	EC 900	1.68	Post-em	97	Beans	≤ 0.01	1994/11282
USA, Tennessee, 1993 (Pioneer 9551)	EC 900	1.68	Post-em	119	Beans	≤ 0.01	1994/11282

'Post-em' = post-emergence broadcast spray at crop 2-4-leaf growth stage

In trials in USA, conducted in 1991, dimethenamid was applied at a rate of 1.68 kg ai/ha to separate single-replicate plots as single pre-plant broadcast sprays (followed by shallow soil incorporation) on the day of planting, single pre-emergence broadcast sprays also on the day of planting, or single post-emergence broadcast sprays when the plants were at the 1–2 leaf stage (6–22 days after planting). Whole plants (without roots) were sampled twice during the 4 months after planting (to reflect use as forage and hay) and mature beans and straw were also sampled when the crops were harvested, in most trials this being by combine harvester.

Samples were analysed for dimethenamid using Method BS2304, with an LOQ of 0.01 mg/kg and recovery rates of 99 ± 9% (n=7) for whole plants-forage, 88 ± 13 (n=7) for whole plants-hay, 87 ± 11% (n=7) for beans and 87 ± 13% (n=7) for straw at fortification levels of 0.01-0.2 mg/kg [Ref: 1992/12442]. Residues of the sulfonate metabolite were also measured in stored forage, hay and straw samples from these trials (within 21 months of sampling), using Method AM-0868-0392-1 (LOQs of 0.1 mg/kg in straw and hay, 0.2 mg/kg in forage, average recovery rate of 75 ± 11% n=29 at fortification levels of 0.1-0.5 mg/kg) [Ref: 1993/11797]. Grain samples were also analysed for the sulfonate metabolite using the same method (AM-0868-0392-1) with an LOQ of 0.05 mg/kg and a recovery rate of 90 ± 5% (n=12), fortified at 0.05-0.5 mg/kg [Ref 1993/11748].

Table 34. Residue data summary of supervised trials on soya beans in USA, involving a single pre-plant treatment with dimethenamid.

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)			Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	Sulfonate	
USA, Kansas, 1991 (Pioneer 9272)	EC 900	1.68	Pre-plant	111	Beans	< 0.01		< 0.05	1992/12442 1993/11748[1]
USA, Georgia, 1991 (HSC 721)	EC 900	1.68	Pre-plant	149	Beans	< 0.01		< 0.05	1992/12442 1993/11748[1]
USA, Indiana, 1991 (Pioneer 9303)	EC 900	1.68	Pre-plant	156	Beans	< 0.01		< 0.05	1992/12442 1993/11748[1]
USA, Maryland, 1991 (Union Beans)	EC 900	1.68	Pre-plant	116	Beans	< 0.01		< 0.05	1992/12442 1993/11748[1]
USA, Minnesota, 1991 (Glenwood)	EC 900	1.68	Pre-plant	112	Beans	< 0.01		0.05	1992/12442 1993/11748[1]
USA, Nebraska, 1991 (NC 3M28)	EC 900	1.68	Pre-plant	135	Beans	< 0.01		< 0.05	1992/12442 1993/11748[1]
USA, Ohio, 1991 (Pioneer 9361)	EC 900	1.68	Pre-plant	125	Beans	< 0.01		< 0.05	1992/12442 1993/11748[1]

Pre-plant = soil applied and shallow rotary hoe incorporation to 5-8cm just before planting
[1]) Reanalysis of stored grain samples for the sulfonate metabolite

Table 35. Residue data summary of supervised trials on soya beans in USA, involving a single pre-emergence treatment with dimethenamid.

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)			Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	Sulfonate	
USA, Georgia, 1991 (HSC 721)	EC 900	1.68	Pre-em	149	Beans	< 0.01		< 0.05	1992/12442 1993/11748[1]
USA, Indiana, 1991 (Pioneer 9303)	EC 900	1.68	Pre-em	156	Beans	< 0.01		< 0.05	1992/12442 1993/11748[1]
USA, Kansas, 1991 (Pioneer 9272)	EC 900	1.68	Pre-em	111	Beans	< 0.01		< 0.05	1992/12442 1993/11748[1]
USA, Maryland, 1991 (Union Beans)	EC 900	1.68	Pre-em	116	Beans	< 0.01		< 0.05	1992/12442 1993/11748[1]
USA, Minnesota, 1991 (Glenwood)	EC 900	1.68	Pre-em	112	Beans	< 0.01		< 0.05	1992/12442 1993/11748[1]
USA, Nebraska, 1991 (NC 3M28)	EC 900	1.68	Pre-em	134	Beans	< 0.01		< 0.05	1992/12442 1993/11748[1]
USA, Ohio, 1991 (Pioneer 9361)	EC 900	1.68	Pre-em	125	Beans	< 0.01		< 0.05	1992/12442 1993/11748[1]

Pre-em = pre-emergence broadcast spray
[1]) Reanalysis of stored grain samples for the sulfonate metabolite

Table 36. Residue data summary of supervised trials on soya beans in USA, involving a single post-emergence treatment with dimethenamid.

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)			Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	Sulfonate	
USA, Georgia, 1991 (HSC 721)	EC 900	1.68	Post-em 2-leaf	136	Beans	≤ 0.01		< 0.05	1992/12442 1993/11748[1]
USA, Indiana, 1991 (Pioneer 9303)	EC 900	1.68	Post-em 2-leaf	145	Beans	≤ 0.01		< 0.05	1992/12442 1993/11748[1]
USA, Kansas, 1991 (Pioneer 9272)	EC 900	1.68	Post-em 2-leaf	100	Beans	≤ 0.01		< 0.05	1992/12442 1993/11748[1]
USA, Maryland, 1991 (Union Beans)	EC 900	1.68	Post-em 2-leaf	104	Beans	≤ 0.01		< 0.05	1992/12442 1993/11748[1]
USA, Minnesota, 1991 (Glenwood)	EC 900	1.68	Post-em 2-leaf	93	Beans	≤ 0.01		< 0.05	1992/12442 1993/11748[1]
USA, Nebraska, 1991 (NC 3M28)	EC 900	1.68	Post-em 2-leaf	121	Beans	≤ 0.01		< 0.05	1992/12442 1993/11748[1]
USA, Ohio, 1991 (Pioneer 9361)	EC 900	1.68	Post-em 2-leaf	110	Beans	≤ 0.01		< 0.05	1992/12442 1993/11748[1]

Post-em = post emergence broadcast spray applied when plants were about the 2-leaf stage

[1]) Reanalysis of stored grain samples for the sulfonate metabolite

In earlier trials in USA, conducted in 1989 and 1990, dimethenamid was applied at a rate of 1.68 kg ai/ha to separate single-replicate plots as single pre-plant broadcast sprays (followed by shallow soil incorporation) on the day of planting, single pre-emergence broadcast sprays also on the day of planting, or single post-emergence broadcast sprays when the plants were at the 1-2 leaf stage (6-22 days after planting). Whole plants (without roots) were sampled twice during the 4 months after planting (to reflect use as forage and hay) and mature beans and straw were also sampled when the crops were harvested, in most trials this being by combine harvester.

In the 1989 trials, both the 720 g ai/litre and 900 g ai/litre EC formulations were used and the samples were analysed for dimethenamid and the oxalamide metabolite using Method AM-0850-0291-0 with an LOQ of 0.02 mg/kg and recovery rates ranging from 107 ± 48% (oxalamide metabolite in whole plants-hay) to 169 ± 29% (dimethenamid in beans). In these trials some samples were also analysed for the sulfonate metabolite using Method AM-868-0392-1, with LOQs of 0.05 mg/kg (forage and grain) and 0.1 mg/kg (hay and straw), with recovery rates of 79 ± 7% (n=7) for whole plants (forage), 111% (n=1) for beans and 89 ± 10% (n=3) for hay and straw at a fortification levels of 0.2–1.0 mg/kg.

In the 1990 trials, samples were analysed for dimethenamid and the oxalamide metabolite using Method AM-0850-0291-0, but because of the variability in the recovery rates, the analysis (for dimethenamid only) was repeated (within 27 months) using Method BS2304, with an LOQ of 0.01 mg/kg and recovery rates of 95 ± 8% (n=6) for whole plants-forage, 94 ± 9 (n=5) for whole plants-hay, 97 ± 13% (n=4) for beans and 90 ± 11% (n=4) for straw at fortification levels of 0.01–0.2 mg/kg [Ref: 1992/12443].

For the oxalamide metabolite, analysed using method AM-0850-0291-0, the reported LOQ was 0.02 mg/kg with recovery rates of 118 ± 30% (n=6) for whole plants-forage, 113 ± 53% (n=5) for

whole plants-hay, 122 ± 29% (n=4) for beans and 129 ± 46% (n=4) for straw at a fortification level of 0.1 mg/kg.

Residues of the sulfonate metabolite were also measured in stored forage, hay and straw samples from these trials (within 32 months of sampling), using Method AM-0868-0392-1 (LOQs of 0.1 mg/kg in straw and hay, 0.2 mg/kg in forage, average recovery rate of 75 ± 11% n=29 at fortification levels of 0.1–0.5 mg/kg) [Ref: 1993/11797]. Grain samples were also analysed for the sulfonate metabolite using the same method (AM-0868-0392-1) with an LOQ of 0.05 mg/kg and a recovery rate of 90 ± 5% (n=12), fortified at 0.05-0.5 mg/kg [Ref 1993/11748].

Table 37. Residue data summary of supervised trials on soya beans in USA, involving a single pre-plant treatment with dimethenamid.

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)			Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	Sulfonate	
USA, Louisiana, 1989 (Coker 485)	EC 720	1.68	Pre-plant	104	Beans	< 0.02	0.02, < 0.02		1991/11899 duplicate analysis
USA, Arkansas, 1989 (Shiloh)	EC 720	1.68	Pre-plant	178	Beans	< 0.02	< 0.02	< 0.1	1991/11899
USA, Arkansas, 1989 (Shiloh)	EC 900	1.68	Pre-plant	178	Beans	< 0.02	< 0.02		1991/11899
USA, Georgia, 1989 (Wright)	EC 720	1.68	Pre-plant	172	Beans	< 0.02	< 0.02		1991/11899
USA, Georgia, 1989 (Wright)	EC 900	1.68	Pre-plant	172	Beans	< 0.02	< 0.02		1991/11899
USA, Iowa 1989 (Stine 2770)	EC 720	1.68	Pre-plant	143	Beans	< 0.02	< 0.02	< 0.05	1991/11899
USA, Iowa 1989 (Stine 2770)	EC 900	1.68	Pre-plant	143	Beans	< 0.02			1991/11899
USA, Louisiana, 1989 (Coker 485)	EC 900	1.68	Pre-plant	104	Beans	< 0.02	< 0.02		1991/11899
USA, Minnesota 1989 (Glenwood SB)	EC 720	1.68	Pre-plant	134	Beans	< 0.02	< 0.02		1991/11899
USA, Minnesota 1989 (Glenwood SB)	EC 900	1.68	Pre-plant	134	Beans	< 0.02	< 0.02		1991/11899
USA, Missouri 1989 (Asgrow 3127)	EC 720	1.68	Pre-plant	154	Beans	< 0.02	< 0.02		1991/11899
USA, Missouri 1989 (Asgrow 3127)	EC 900	1.68	Pre-plant	154	Beans	< 0.02	< 0.02		1991/11899
USA, Illinois, 1990 (NK 2920)	EC 900	1.68	Pre-plant	137	Beans	< 0.01	< 0.02	< 0.05	1991/11823 1992/12443[1] 193/11748[2]
USA, Minnesota, 1990 (Glenwood SB)	EC 900	1.68	Pre-plant	126	Beans	< 0.01	< 0.02	< 0.05	1991/11823 1992/12443[1] 193/11748[2]

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)			Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	Sulfonate	
USA, Nth Carolina 1990 (Deltapine 416)	EC 900	1.68	Pre-plant	158	Beans	< 0.01	< 0.02	< 0.05	1991/11823 1992/12443[1] 193/11748[2]
USA, Ohio 1990 (Dekalb CX415)	EC 900	1.68	Pre-plant	154	Beans	< 0.01	< 0.02	< 0.05	1991/11823 1992/12443[1] 193/11748[2]

Pre-plant = soil applied and shallow rotary hoe incorporation to 5-8cm just before planting

[1]) Reanalysis of stored samples (for dimethenamid only) using method BS2304

[2]) Reanalysis of stored grain samples for the sulfonate metabolite of Dimethenamid

Table 38. Residue data summary of supervised trials on soya beans in USA, involving a single pre-emergence treatment with dimethenamid.

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)			Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	Sulfonate	
USA, Arkansas, 1989 (Shiloh)	EC 720	1.68	Pre-em	178	Beans	< 0.02	< 0.02		1991/11899
USA, Arkansas, 1989 (Shiloh)	EC 900	1.68	Pre-em	178	Beans	< 0.02	< 0.02		1991/11899
USA, Georgia, 1989 (Wright)	EC 720	1.68	Pre-em	172	Beans	< 0.02	< 0.02		1991/11899
USA, Georgia, 1989 (Wright)	EC 900	1.68	Pre-em	172	Beans	< 0.02	< 0.02		1991/11899
USA, Iowa 1989 (Stine 2770)	EC 720	1.68	Pre-em	143	Beans	< 0.02	< 0.02		1991/11899
USA, Iowa 1989 (Stine 2770)	EC 900	1.68	Pre-em	143	Beans	< 0.02	< 0.02		1991/11899
USA, Louisiana, 1989 (Coker 485)	EC 720	1.68	Pre-em	104	Beans	< 0.02	< 0.02		1991/11899
USA, Louisiana, 1989 (Coker 485)	EC 900	1.68	Pre-em	104	Beans	< 0.02	< 0.02		1991/11899
USA, Minnesota 1989 (Glenwood SB)	EC 720	1.68	Pre-em	134	Beans	< 0.02	< 0.02		1991/11899
USA, Minnesota 1989 (Glenwood SB)	EC 900	1.68	Pre-em	134	Beans	< 0.02	< 0.02		1991/11899
USA, Missouri 1989 (Asgrow 3127)	EC 720	1.68	Pre-em	153	Beans	< 0.02	< 0.02		1991/11899
USA, Missouri 1989 (Asgrow 3127)	EC 900	1.68	Pre-em	153	Beans	< 0.02	< 0.02		1991/11899
USA, Illinois, 1990 (NK 2920)	EC 900	1.68	Pre-em	137	Beans	< 0.01	< 0.02	< 0.05	1991/11823 1992/12443[1] 193/11748[2]

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)			Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	Sulfonate	
USA, Minnesota, 1990 (Glenwood SB)	EC 900	1.68	Pre-em	126	Beans	< 0.01	< 0.02	< 0.05	1991/11823 1992/12443[1] 193/11748[2]
USA, Nth Carolina 1990 (Deltapine 416)	EC 900	1.68	Pre-em	158	Beans	< 0.01	< 0.02	< 0.05	1991/11823 1992/12443[1] 193/11748[2]
USA, Ohio 1990 (Dekalb CX415)	EC 900	1.68	Pre-em	154	Beans	< 0.01	< 0.02	< 0.05	1991/11823 1992/12443[1] 193/11748[2]

Pre-em = pre-emergence broadcast spray

[1]) Reanalysis of stored samples (for dimethenamid only) using method BS2304

[2]) Reanalysis of stored grain samples for the sulfonate metabolite of dimethenamid

Table 39. Residue data summary of supervised trials on soya beans in USA, involving a single post-emergence treatment with dimethenamid.

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)			Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	Sulfonate	
USA, Louisiana, 1989 (Coker 485)	EC 720	1.68	Post-em 2-leaf	97	Beans	< 0.02	< 0.02		1991/11899
USA, Arkansas, 1989 (Shiloh)	EC 720	1.68	Post-em 2-leaf	168	Beans	< 0.02	< 0.02		1991/11899
USA, Arkansas, 1989 (Shiloh)	EC 900	1.68	Post-em 2-leaf	168	Beans	< 0.02	< 0.02		1991/11899
USA, Georgia, 1989 (Wright)	EC 720	1.68	Post-em 2-leaf	164	Beans	< 0.02	< 0.02		1991/11899
USA, Georgia, 1989 (Wright)	EC 900	1.68	Post-em 2-leaf	164	Beans	< 0.02	< 0.02		1991/11899
USA, Iowa 1989 (Stine 2770)	EC 720	1.68	Post-em 2-leaf	132	Beans	< 0.02	< 0.02		1991/11899
USA, Iowa 1989 (Stine 2770)	EC 900	1.68	Post-em 2-leaf	4132	Beans	< 0.02	< 0.02		1991/11899
USA, Louisiana, 1989 (Coker 485)	EC 900	1.68	Post-em 2-leaf	97	Beans	< 0.02	< 0.02		1991/11899
USA, Minnesota 1989 (Glenwood SB)	EC 720	1.68	Post-em 2-leaf	120	Beans	< 0.02	< 0.02		1991/11899
USA, Minnesota 1989 (Glenwood SB)	EC 900	1.68	Post-em 2-leaf	120	Beans	< 0.02	< 0.02		1991/11899
USA, Missouri 1989 (Asgrow 3127)	EC 720	1.68	Post-em 2-leaf	142	Beans	< 0.02	< 0.02		1991/11899
USA, Missouri 1989 (Asgrow 3127)	EC 900	1.68	Post-em 2-leaf	142	Beans	< 0.02			1991/11899

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)			Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	Sulfonate	
USA, Illinois, 1990 (NK 2920)	EC 900	1.68	Post-em 2-leaf	123	Beans	< 0.01	< 0.02	< 0.05	1991/11823 1992/12443[1] 193/11748[2]
USA, Minnesota, 1990 (Glenwood SB)	EC 900	1.68	Post-em 2-leaf	104	Beans	< 0.01	< 0.02	< 0.05	1991/11823 1992/12443[1] 193/11748[2]
USA, Nth Carolina 1990 (Deltapine 416)	EC 900	1.68	Post-em 2-leaf	152	Beans	< 0.01	< 0.02	< 0.05	1991/11823 1992/12443[1] 193/11748[2]
USA, Ohio 1990 (Dekalb CX415)	EC 900	1.68	Post-em 2-leaf	154	Beans	< 0.01	< 0.02	< 0.05	1991/11823 1992/12443[1] 193/11748[2]

Post-em = post emergence broadcast spray applied when plants were about the 2-leaf stage

[1]) Reanalysis of stored samples (for dimethenamid only) using method BS2304

[2]) Reanalysis of stored grain samples for the sulfonate metabolite of dimethenamid

Potatoes

In trials on potatoes in USA, dimethenamid-P was applied to separate single-replicate plots as a single pre-plant broadcast spray (0.92–0.96 kg ai/ha), followed by shallow soil incorporation, up to 1 day before planting, as a single pre-emergence broadcast spray (0.9–0.97 kg ai/ha), within 24 days after planting or as a single post-emergence broadcast spray when the plants were between 20cm and 70 cm in height. Application rates of 0.91–0.95 kg ai/ha and 1.39–1.44 kg ai/ha were used in the two post-emergence treatment plots.

Tubers were sampled at least 60 days after the pre-plant and pre-emergence treatments and at least 39 days after the post-emergence treatment, with additional samples being taken at harvest time. Samples were analysed using Method AM-0884-0193-1, with an LOQ of 0.01 mg/kg and recovery rates of 87 ± 7% (n=19) at fortification levels of 0.01–0.05 mg/kg.

GAPs for dimethenamid-P on potatoes and sweet potatoes are:

Crop	Country	Application		Max use/season		PHI (days)	Comments
		Method	kg ai/ha	No	kg ai/ha		
Potato	USA	pre-em	0.63 – 1.1	1	1.1	40	
Sweet potato	USA	pre-em	0.63 – 1.1	1	1.1	40	

Table 40. Residue data summary of supervised trials on potatoes in USA, involving a single pre-plant treatment with dimethenamid-P.

POTATOES Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, California, 1997 (White Rose)	EC 720	0.92	Pre-plant	60 128	Tubers	< 0.01 < 0.01	1995/5109
USA, Florida, 1997 (Red Lasoda)	EC 720	0.92	Pre-plant	60 77	Tubers	< 0.01 < 0.01	1995/5109
USA, Idaho, 1997 (Red Norland)	EC 720	0.92	Pre-plant	61 86	Tubers	< 0.01 < 0.01	1995/5109
USA, Nth Carolina, 1997 (Irish Cobler)	EC 720	0.92	Pre-plant	60 101	Tubers	< 0.01 < 0.01	1995/5109

POTATOES Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Oregon, 1997 (Chieften)	EC 720	0.92	Pre-plant	39 62	Tubers	< 0.01 < 0.01	1995/5109
USA, Oregon, 1997 (Russet)	EC 720	0.92	Pre-plant	60 79	Tubers	< 0.01 < 0.01	1995/5109
USA, Oregon, 1997 (Russet)	EC 720	0.92	Pre-plant	60 119	Tubers	< 0.01 < 0.01	1995/5109
USA, Washington, 1997 (Russet Burbank)	EC 720	0.92	Pre-plant	60 119	Tubers	< 0.01 < 0.01	1995/5109
USA, Colorado, 1997 (Red La Soda)	EC 720	0.93	Pre-plant	60 99	Tubers	< 0.01 < 0.01	1995/5109
USA, Idaho, 1997 (Shepody)	EC 720	0.93	Pre-plant	61 72	Tubers	< 0.01 < 0.01	1995/5109
USA, Michigan, 1997 (Norland Dark Red)	EC 720	0.94	Pre-plant	60 80	Tubers	< 0.01 < 0.01	1995/5109
USA, Michigan, 1997 (Onaway)	EC 720	0.94	Pre-plant	60 80	Tubers	< 0.01 < 0.01	1995/5109
USA, Washington, 1997 (Russet Burbank)	EC 720	0.94	Pre-plant	60 80	Tubers	< 0.01 < 0.01	1995/5109
USA, Pennsylvania, 1997 (Dark Red Norlands)	EC 720	0.95	Pre-plant	60 90	Tubers	< 0.01 < 0.01	1995/5109
USA, Wisconsin, 1997 (Russet Burbank)	EC 720	0.95	Pre-plant	62 132	Tubers	< 0.01 < 0.01	1995/5109
USA, New Jersey, 1997 (Dark Red Norlands)	EC 720	0.96	Pre-plant	61 89	Tubers	< 0.01 < 0.01	1995/5109
USA, Wisconsin, 1997 (Russet Norkotah)	EC 720	0.96	Pre-plant	62 135	Tubers	< 0.01 < 0.01	1995/5109

Table 41. Residue data summary of supervised trials on potatoes in USA, involving a single pre-emergence treatment with dimethenamid-P.

POTATOES Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Colorado, 1997 (Red La Soda)	EC 720	0.9	Pre-em	60 99	Tubers	< 0.01 ≤ 0.01	1995/5109
USA, California, 1997 (White Rose)	EC 720	0.92	Pre-em	60 128	Tubers	< 0.01 ≤ 0.01	1995/5109
USA, Oregon, 1997 (Chieften)	EC 720	0.92	Pre-em	39 62	Tubers	≤ 0.01 < 0.01	1995/5109
USA, Oregon, 1997 (Russet)	EC 720	0.92	Pre-em	60 79	Tubers	< 0.01 ≤ 0.01	1995/5109
USA, Oregon, 1997 (Russet)	EC 720	0.92	Pre-em	60 119	Tubers	< 0.01 ≤ 0.01	1995/5109
USA, Washington, 1997 (Russet Burbank)	EC 720	0.92	Pre-em	60 105	Tubers	< 0.01 ≤ 0.01	1995/5109
USA, Florida, 1997 (Red Lasoda)	EC 720	0.93	Pre-em	60 77	Tubers	< 0.01 ≤ 0.01	1995/5109
USA, Nth Carolina, 1997 (Irish Cobler)	EC 720	0.93	Pre-em	60 101	Tubers	< 0.01 ≤ 0.01	1995/5109
USA, Washington, 1997 (Russet Burbank)	EC 720	0.93	Pre-em	60 70	Tubers	< 0.01 ≤ 0.01	1995/5109

POTATOES Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Idaho, 1997 (Red Norland)	EC 720	0.94	Pre-em	61 86	Tubers	< 0.01 ≤ 0.01	1995/5109
USA, Michigan, 1997 (Norland Dark Red)	EC 720	0.94	Pre-em	60 80	Tubers	< 0.01 ≤ 0.01	1995/5109
USA, Michigan, 1997 (Onaway)	EC 720	0.94	Pre-em	60 80	Tubers	< 0.01 ≤ 0.01	1995/5109
USA, Wisconsin, 1997 (Russet Burbank)	EC 720	0.95	Pre-em	60 111	Tubers	< 0.01 ≤ 0.01	1995/5109
USA, Wisconsin, 1997 (Russet Norkotah)	EC 720	0.95	Pre-em	60 112	Tubers	< 0.01 ≤ 0.01	1995/5109
USA, New Jersey, 1997 (Dark Red Norlands)	EC 720	0.96	Pre-em	61 89	Tubers	< 0.01 ≤ 0.01	1995/5109
USA, Pennsylvania, 1997 (Dark Red Norlands)	EC 720	0.96	Pre-em	60 90	Tubers	< 0.01 ≤ 0.01	1995/5109
USA, Idaho, 1997 (Shepody)	EC 720	0.97	Pre-em	61 72	Tubers	< 0.01 ≤ 0.01	1995/5109

Water rates of 90-100 litres/ha

Table 42. Residue data summary of supervised trials on potatoes in USA, involving a single post-emergence treatment with dimethenamid-P.

POTATOES Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Oregon, 1997 (Russet)	EC 720	0.91	Post-em (45-50cm)	40	Tubers	≤ 0.01	1995/5109
USA, Oregon, 1997 (Russet)	EC 720	0.91	Post-em (38cm)	39	Tubers	≤ 0.01	1995/5109
USA, California, 1997 (White Rose)	EC 720	0.92	Post-em (45-50cm)	40	Tubers	≤ 0.01	1995/5109
USA, Colorado, 1997 (Red La Soda)	EC 720	0.92	Post-em (30-38cm)	39	Tubers	≤ 0.01	1995/5109
USA, Idaho, 1997 (Shepody)	EC 720	0.92	Post-em (20-35cm)	39	Tubers	≤ 0.01	1995/5109
USA, Idaho, 1997 (Red Norland)	EC 720	0.93	Post-em (42-50cm)	40	Tubers	≤ 0.01	1995/5109 at flowering
USA, Michigan, 1997 (Onaway)	EC 720	0.93	Post-em (35-38cm)	40	Tubers	≤ 0.01	1995/5109 early flower
USA, Oregon, 1997 (Chieften)	EC 720	0.93	Post-em (20cm)	39	Tubers	≤ 0.01	1995/5109
USA, Pennsylvania, 1997 (Dark Red Norlands)	EC 720	0.93	Post-em (45-50cm)	40	Tubers	≤ 0.01	1995/5109
USA, Washington, 1997 (Russet Burbank)	EC 720	0.93	Post-em (60cm)	40	Tubers	≤ 0.01	1995/5109
USA, Washington, 1997 (Russet Burbank)	EC 720	0.93	Post-em (28cm)	40	Tubers	≤ 0.01	1995/5109
USA, Florida, 1997 (Red Lasoda)	EC 720	0.94	Post-em (45-70cm)	39	Tubers	≤ 0.01	1995/5109 flowering
USA, Michigan, 1997 (Norland Dark Red)	EC 720	0.94	Post-em (35-50cm)	40	Tubers	≤ 0.01	1995/5109
USA, Nth Carolina, 1997 (Irish Cobler)	EC 720	0.94	Post-em (45-70cm)	40	Tubers	≤ 0.01	1995/5109 flowering

POTATOES Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Wisconsin, 1997 (Russet Norkotah)	EC 720	0.94	Post-em (30-38cm)	40	Tubers	≤ 0.01	1995/5109
USA, New Jersey, 1997 (Dark Red Norlands)	EC 720	0.95	Post-em (45-50cm)	41	Tubers	≤ 0.01	1995/5109
USA, Wisconsin, 1997 (Russet Burbank)	EC 720	0.95	Post-em (30-38cm)	40	Tubers	≤ 0.01	1995/5109
USA, Colorado, 1997 (Red La Soda)	EC 720	1.38	Post-em (30-38cm)	39	Tubers	≤ 0.01	1995/5109
USA, California, 1997 (White Rose)	EC 720	1.39	Post-em (45-50cm)	40	Tubers	≤ 0.01	1995/5109
USA, Idaho, 1997 (Shepody)	EC 720	1.39	Post-em (20-35cm)	39	Tubers	≤ 0.01	1995/5109
USA, Florida, 1997 (Red Lasoda)	EC 720	1.4	Post-em (45-70cm)	39	Tubers	≤ 0.01	1995/5109 flowering
USA, Michigan, 1997 (Norland Dark Red)	EC 720	1.4	Post-em (35-50cm)	40	Tubers	≤ 0.01	1995/5109
USA, Michigan, 1997 (Onaway)	EC 720	1.4	Post-em (35-38cm)	20 30 40 50	Tubers	< 0.01 < 0.01 < 0.01 ≤ 0.01	1995/5109 early flower
USA, Nth Carolina, 1997 (Irish Cobler)	EC 720	1.4	Post-em (45-70cm)	40	Tubers	≤ 0.01	1995/5109 flowering
USA, Oregon, 1997 (Chieften)	EC 720	1.4	Post-em (20cm)	39	Tubers	≤ 0.01	1995/5109
USA, Washington, 1997 (Russet Burbank)	EC 720	1.4	Post-em (60cm)	40	Tubers	≤ 0.01	1995/5109
USA, Washington, 1997 (Russet Burbank)	EC 720	1.4	Post-em (28cm)	20 30 40 50	Tubers	< 0.01 < 0.01 < 0.01 ≤ 0.01	1995/5109
USA, Wisconsin, 1997 (Russet Burbank)	EC 720	1.41	Post-em (30-38cm)	40	Tubers	≤ 0.01	1995/5109
USA, Idaho, 1997 (Red Norland)	EC 720	1.42	Post-em (42-50cm)	40	Tubers	≤ 0.01	1995/5109 flowering
USA, Pennsylvania, 1997 (Dark Red Norlands)	EC 720	1.42	Post-em (45-50cm)	40	Tubers	≤ 0.01	1995/5109
USA, Oregon, 1997 (Russet)	EC 720	1.43	Post-em (45-50cm)	40	Tubers	≤ 0.01	1995/5109
USA, Oregon, 1997 (Russet)	EC 720	1.43	Post-em (38cm)	39	Tubers	≤ 0.01	1995/5109
USA, Wisconsin, 1997 (Russet Norkotah)	EC 720	1.43	Post-em (30-38cm)	40	Tubers	≤ 0.01	1995/5109
USA, New Jersey, 1997 (Dark Red Norlands)	EC 720	1.44	Post-em (45-50cm)	41	Tubers	≤ 0.01	1995/5109

Post-em = post-emergence broadcast spray

Sugar beet

In trials on sugar beet, dimethenamid-P was applied to two single-replicate plots as a single post-emergence broadcast spray when the sugar beet plants were close to the 8-leaf growth stage, between 30 and 100 days after planting. Application rates of 0.68–0.72 kg ai/ha and 1.1–1.2 kg ai/ha (140-280 litres spray mix/ha) were used in the two treatment plots. Sugar beet tops and roots were sampled at maturity and analysed using Method AM-0884-0193-1 to measure dimethenamid residues, with an

LOQ of 0.01 mg/kg and recovery rates of 106 ± 18% (n=8) in sugar beet tops and 110 ± 12% (n=6) in sugar beet roots at fortification levels of 0.02 and 0.05 mg/kg.

In 4 European bridging trials (France, Germany and Netherlands, 1998), dimethenamid-P and dimethenamid were applied side-by-side as single post-emergence broadcast sprays when the sugar beet plants were at the 8-9 leaf growth stage, about 25-30 days after planting. Application rates for the dimethenamid-P treatments were 0.65–0.71 kg ai/ha and 1.07–1.12 kg ai/ha for dimethenamid. Sugar beet plants were sampled on the day of treatment and again 9-15 days later, with tops and roots also being sampled 7-8 weeks after planting and again at harvest. Samples were analysed using Method BASF 980/0 with an LOQ of 0.01 mg/kg and recovery rates of 85 ± 9% (n=3) in whole plants, 85 ± 20% (n=3) in sugar beet tops and 70 ± 12% (n=4) in sugar beet roots at fortification levels of 0.01 and 1.0 mg/kg.

In trials conducted in France, 1995, dimethenamid was applied to 2-replicated plots as post-emergence treatments before the sugar beet reached the 5-leaf growth stage, either three times at 0.88–0.95 kg ai/ha or 4 times at 0.44–0.46 kg ai/ha with the treatments being 7-14 days apart. In these trials, whole plants were sampled on the day of the last treatment, with roots and tops being sampled three times at about 30 day intervals and again at harvest. Method BS 2304 was used to measure dimethenamid residues, with an LOQ of 0.01 mg/kg and recovery rates of 87 ± 10% (n=7) in whole plants, 92 ± 4% (n=12) in sugar beet tops and 89 ± 9% (n=11) in sugar beet roots at fortification levels of 0.01, 0.1, 0.2 and 20 mg/kg.

In trials conducted in 1996 (Germany and Switzerland), dimethenamid was applied to single replicate plots as post-emergence treatments three times (8–20 day intervals) before the sugar beet reached the 9-leaf growth stage, either at 0.43–0.46 kg ai/ha or at 1.76–1.8 kg ai/ha. In these trials, whole plants were sampled on the day of the last treatment, with roots and tops being sampled three times at about 30 day intervals and again at harvest. Method BASF 980/0 was used to measure dimethenamid residues, with an LOQ of 0.01 mg/kg and recovery rates of 85 ± 5% (n=2) in whole plants, 84 ± 8% (n=12) in sugar beet tops and in roots at fortification levels of 0.01, 0.1, 0.5 and 50 mg/kg.

GAPs for dimethenamid-P on sugar beet, fodder beet and beetroot are:

	Country	Application		Max use/season		PHI (days)	Comments
		Method	kg ai/ha	No	kg ai/ha		
Sugar beet	Belgium	post-em	0.25 – 0.36	3	0.72		from 4-6 leaf stage
Sugar beet	Belgium	post-em	0.72	1			at 6-8 leaf stage
Sugar beet	Germany	post-em	0.65	1			at 6-8 leaf stage
Sugar beet	Netherlands	post-em	0.22	3			from 2-leaf stage
Sugar beet	Netherlands	post-em	0.33	2			from 4-leaf stage
Sugar beet	Netherlands	post-em	0.65	1			
Sugar beet	USA	post-em	0.63 – 1.1	1-2[1]	1.1	60	at 2-12 leaf stage
Fodder beet	Belgium	post-em	0.25 – 0.36	3	0.72		from 4-6 leaf stage
Fodder beet	Belgium	post-em	0.72	1			at 6-8 leaf stage
Fodder beet	Netherlands	post-em	0.22	3			from 2-leaf stage
Fodder beet	Netherlands	post-em	0.33	2			from 4-leaf stage
Fodder beet	Netherlands	post-em	0.65	1			
Beetroot	USA	post-em	0.63-1.1	1-2[1]	1.1	60	from 2-6 leaf stage

[1]) Split applications also recommended, generally involving pre-plant or pre-emergence treatment at 50-66% recommended rate and a pre-emergence or post-emergence treatment at 33-50% recommended rate, not closer than 14 days later

Table 43. Residue data summary of supervised trials on sugar beet in USA, involving single post-emergence treatments with dimethenamid-P.

SUGAR BEET Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Idaho, 1998 (HMWS 91)	EC 720	0.68	Post-em	110	Roots	< 0.01	2004/5000740
USA, California, 1998 (Beta 4581)	EC 720	0.7	Post-em	105	Roots	< 0.01	2004/5000740
USA, California, 1998 (Spreckles SS-NB3)	EC 720	0.7	Post-em	109	Roots	< 0.01	2004/5000740
USA, Colorado, 1998 (ACH 177)	EC 720	0.7	Post-em	104	Roots	< 0.01	2004/5000740
USA, Michigan, 1998 (Crystal 308)	EC 720	0.7	Post-em	104	Roots	< 0.01	2004/5000740
USA, Minnesota, 1998 (KW 2249)	EC 720	0.7	Post-em	121	Roots	< 0.01	2004/5000740
USA, Nth Dakota, 1998 (ACH 192)	EC 720	0.7	Post-em	92	Roots	< 0.01	2004/5000740
USA, Texas, 1998 (Wrangler)	EC 720	0.7	Post-em	80	Roots	< 0.01	2004/5000740
USA, Idaho, 1998 (PM-6)	EC 720	0.72	Post-em	118	Roots	< 0.01	2004/5000740
USA, Minnesota, 1998 (VDH 66156)	EC 720	0.72	Post-em	107	Roots	< 0.01	2004/5000740
USA, Nth Dakota, 1998 (Crystal 222)	EC 720	0.72	Post-em	110	Roots	< 0.01	2004/5000740
USA, Wisconsin, 1998 (Beta 6836)	EC 720	0.72	Post-em	36 48 60 72 84	Roots	< 0.01 < 0.01 < 0.01 < 0.01 < 0.01	2004/5000740
USA, California, 1998 (Beta 4581)	EC 720	1.1	Post-em	105	Roots	< 0.01	2004/5000740
USA, California, 1998 (Spreckles SS-NB3)	EC 720	1.1	Post-em	109	Roots	< 0.01	2004/5000740
USA, Colorado, 1998 (ACH 177)	EC 720	1.1	Post-em	104	Roots	< 0.01	2004/5000740
USA, Idaho, 1998 (HMWS 91)	EC 720	1.1	Post-em	110	Roots	< 0.01	2004/5000740
USA, Idaho, 1998 (PM-6)	EC 720	1.1	Post-em	118	Roots	< 0.01	2004/5000740
USA, Michigan, 1998 (Crystal 308)	EC 720	1.1	Post-em	104	Roots	< 0.01	2004/5000740
USA, Minnesota, 1998 (VDH 66156)	EC 720	1.1	Post-em	107	Roots	< 0.01	2004/5000740
USA, Nth Dakota, 1998 (ACH 192)	EC 720	1.1	Post-em	92	Roots	< 0.01	2004/5000740
USA, Nth Dakota, 1998 (Crystal 222)	EC 720	1.1	Post-em	110	Roots	< 0.01	2004/5000740
USA, Texas, 1998 (Wrangler)	EC 720	1.1	Post-em	80	Roots	< 0.01	2004/5000740

SUGAR BEET Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Wisconsin, 1998 (Beta 6836)	EC 720	1.1	Post-em	36 48 60 72 84	Roots	< 0.01 < 0.01 < 0.01 < 0.01 < 0.01	2004/5000740
USA, Minnesota, 1998 (KW 2249)	EC 720	1.12	Post-em	121	Roots	< 0.01	2004/5000740

Water rates of 140-280 litres/ha (mostly 190), with oil-based surfactant

Last samples in each trial taken at commercial harvest time

Table 44. Residue data summary of supervised trials on sugar beet in France, Germany and Netherlands, involving single post-emergence treatments with dimethenamid-P

SUGAR BEET Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Netherlands, Limburg, 1998 (Ewita)	EC 900	0.71	Post-em	42 114	Roots	< 0.01 < 0.01	1999/10006 Bridging trial
Germany, Brandenburg, 1998 (Scarlett)	EC 900	0.65	Post-em	43 100	Roots	< 0.01 < 0.01	1999/10006 Bridging trial
France, Pas de Calais, 1998 (Access)	EC 900	0.65	Post-em	52 114	Roots	< 0.01 < 0.01	1999/10006 Bridging trial
France, Cote d'Or, 1998 (Rebecca)	EC 900	0.67	Post-em	43 127	Roots	< 0.01 < 0.01	1999/10006 Bridging trial

Water rates of about 300 litres/ha

Last samples in each trial taken at commercial harvest time

Table 45. Residue data summary of supervised trials on sugar beet in France, Germany, Netherlands and Switzerland, involving single post-emergence treatments with dimethenamid.

SUGAR BEET Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
France, Cote d'Or, 1998 (Rebecca)	EC 900	1.07	Post-em	43 127	Roots	< 0.01 < 0.01	1999/10006 Bridging trial
France, Pas de Calais, 1998 (Access)	EC 900	1.08	Post-em	52 114	Roots	< 0.01 < 0.01	1999/10006 Bridging trial
Germany, Brandenburg, 1998 (Scarlett)	EC 900	1.09	Post-em	43 100	Roots	< 0.01 < 0.01	1999/10006 Bridging trial
Netherlands, Limburg, 1998 (Ewita)	EC 900	1.12	Post-em	42 115	Roots	< 0.01 0.02	1999/10006 Bridging trial last root sample contaminated
Switzerland, Aargau, 1996 (not specified)	EC 900	1.8	Post-em	30 59 91 130	Roots	< 0.01 < 0.01 < 0.01 < 0.01	1998/11036

SUGAR BEET Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Switzerland, Basel, 1996 (Kawavera)	EC 900	1.76	Post-em	30 60 91 136	Roots	< 0.01 < 0.01 < 0.01 ≤ 0.01	1998/11036

Table 46. Residue data summary of supervised trials on sugar beet in France, Germany, Netherlands and Switzerland, involving multiple post-emergence treatments with dimethenamid.

France, Antheuil Portes, 1995 (Loretta)	EC 900	0.9	Post-em	3	29 57 90 119	Roots	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 ≤ 0.01, < 0.01	1996/11031
France, Apilly, 1995 (Dyna)	EC 900	0.9	Post-em	3	30 59 94 142	Roots	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 ≤ 0.01, < 0.01	1996/11031
France, Aubigny en Plaine, 1995 (Riposte)	EC 720	0.91	Post-em	3	31 60 90 138	Roots	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 ≤ 0.01, < 0.01	1996/11031
France, Cuvilly, 1995 (Annick)	EC 900	0.88	Post-em	3	133	Roots	≤ 0.01, < 0.01	1996/11031
France, Mesnil la Comtesse, 1995 (Liberte)	EC 900	0.95	Post-em	3	0 139	Roots	< 0.01, < 0.01 ≤ 0.01, < 0.01	1996/11031
France, Viapre le Petit, 1995 (Cardinal)	EC 900	0.95	Post-em	3	30 59 90 133	Roots	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 ≤ 0.01, < 0.01	1996/11031
Germany, Niedersachsen, 1996 (Reka)	EC 900	0.45	Post-em	3	30 65 91 125	Roots	< 0.01 < 0.01 < 0.01 ≤ 0.01	1998/11036
Germany, Niedersachsen, 1996 (Sonja)	EC 900	0.46	Post-em	3	30 65 91 125	Roots	< 0.01 < 0.01 < 0.01 ≤ 0.01	1998/11036
Switzerland, Aargau, 1996 (not specified)	EC 900	0.43	Post-em	3	27 61 90 112	Roots	< 0.01 < 0.01 < 0.01 ≤ 0.01	1998/11036
Switzerland, Basel, 1996 (Kawavera)	EC 900	0.43	Post-em	3	29 61 92 120	Roots	< 0.01 < 0.01 < 0.01 ≤ 0.01	1998/11036
France, Antheuil Portes, 1995 (Loretta)	EC 900	0.45[1]	Post-em	4	29 57 90 119	Roots	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 ≤ 0.01, < 0.01	1996/11031
France, Apilly, 1995 (Dyna)	EC 900	0.45[1]	Post-em	4	30 59 94 142	Roots	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 ≤ 0.01, < 0.01	1996/11031

France, Aubigny en Plaine, 1995 (Riposte)	EC 720	0.44	Post-em	4	31 60 90 138	Roots	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 ≤ 0.01, < 0.01	1996/11031
France, Cuvilly, 1995 (Annick)	EC 900	0.46	Post-em	4	133	Roots	≤ 0.01, < 0.01	1996/11031
France, Mesnil la Comtesse, 1995 (Liberte)	EC 900	0.47	Post-em	4	139	Roots	≤ 0.01, < 0.01	1996/11031
France, Viapre le Petit, 1995 (Cardinal)	EC 900	0.46	Post-em	4	30 59 90 133	Roots	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 ≤ 0.01, < 0.01	1996/11031

Water rates of 350-450 litres/ha, with oil-based surfactant (France), 190-210 litres/ha (Germany), 450-500 litres/ha (Switzerland)

Last samples in each trial taken at commercial harvest time

[1]) Tank mix with phenmedipham and ethofumesate

Maize

In trials on maize in USA, conducted in 1990 and 1991, dimethenamid was applied as a single pre-plant broadcast spray, followed by shallow soil incorporation, immediately before planting, as a single pre-emergence broadcast spray within 6 days after planting or as a single post-emergence broadcast spray when the maize plants were between the 2-leaf stage and the 9-leaf stage (between 12 and 43 days after planting). Application rates of 1.38-1.68 kg ai/ha were used in the three treatment plots. In these trials, maize plants (without roots) were sampled (as forage) about 50-60 days after planting and again at physiological maturity (as silage), with samples of grain and straw also being taken at the normal harvest time.

In the 1990 trials, Method BS 2304 was used to measure residues of dimethenamid, with an LOQ of 0.01 mg/kg and recovery rates of 97 ± 10% (n=8) in plants-forage, 99 ± 9% (n=9) in plants-silage, 88 ± 8% (n=7) in grain and 88 ± 9% (n=9) in straw at fortification levels of 0.01–0.1 mg/kg. The same analytical method was used in the 1991 trials, with an LOQ of 0.01 mg/kg and recovery rates of 92 ± 12% (n=8) in plants-forage, 84 ± 10% (n=6) in plants-silage, 94 ± 10% (n=6) in grain and 81 ± 11% (n=6) in straw at fortification levels of 0.01–0.1 mg/kg.

In both the 1990 and 1991 trials, stored samples were re-analysed for the sulfonate metabolite using Method AM-0868-0392-1, with LOQs of 0.05mg/kg (grain), 0.2 mg/kg (plants-forage) and 0.1 mg/kg (plants-silage and straw) and recovery rates of 95 ± 26% (n=21) in plants-forage, 76 ± 11% (n=15) in plants-silage, 77 ± 10% (n=13) in grain and 77 ± 12% (n=19) in straw at fortification levels of 0.05–0.5 mg/kg [Ref: 1992/12427].

Maize trials were also conducted in Canada during 1991 and 1992, where single applications of dimethenamid were applied to 4-replicate plots as either pre-plant broadcast sprays (soil-incorporated) on the day of planting or as pre-emergence broadcast sprays up to 5 days after planting or as early post-emergence sprays (12 days after planting). Application rates in these trials ranged from 0.75 kg ai/ha to 3.0 kg ai/ha. Whole plants (without roots) were sampled 2–3 times during the growing season, with straw and either cobs (without husks) or grain also being sampled at normal harvest time and analysed using Method BS 2304 (LOQ 0.01 mg/kg). Recovery rates in these studies averaged 101 ± 15% (n=20) at fortification levels of 0.01-0.12 mg/kg.

In trials in Europe (France, Germany, Greece, Italy, Spain and Switzerland) conducted between 1990 and 1993, dimethenamid was applied once, either as a pre-emergence broadcast treatment or as a post-emergence treatment (up to 28 days after planting), at rates of 1.4–2.9 kg ai/ha, applied in 200–600 litres of water/ha. Whole plants (without roots) were sampled 2-3 times during the

growing season, with straw, cobs (without husks) and grain also being sampled at normal harvest time.

In the 1990 trials, Method BS 1988 was used to measure dimethenamid residues with an LOQ of 0.01 mg/kg and recovery rates of 81–137% in plants and 67–137% in grain at fortification levels of 0.02–0.08 mg/kg. In the later trials (1991-1993), Method BS 2304 was used to measure residues of dimethenamid (LOQ of 0.01 mg/kg) with recovery rates of 88–109% in plants and 78–120% in grain at fortification levels of 0.01–0.5 mg/kg.

In 6 European bridging trials (Belgium, France, Germany, Italy and Netherlands, 1998), dimethenamid-P and dimethenamid were applied side-by-side as single post-emergence broadcast sprays when the maize plants were at the 4-6 leaf growth stage, about 20–40 days after planting. Application rates for the dimethenamid-P treatments were 0.97–1.09 kg ai/ha and 1.33–1.45 kg ai/ha for dimethenamid.

Maize plants were sampled the day of treatment, 20–50 days later and again about 80–100 days after treatment, when the cobs (including husks) were separated from the rest of the plants. Mature grain and straw were also sampled at the normal harvest time. All samples were frozen within 6 hours of sampling and analysed using Method BASF 980/0 to measure dimethenamid residues, with an LOQ of 0.01 mg/kg and average recovery rates of 77–83% at fortification levels of 0.01–5.0 mg/kg.

GAPs for dimethenamid-P on maize are:

Country	Application		Max use/season		PHI (days)	Comments
	Method	kg ai/ha	No	kg ai/ha		
Belgium	pre-em	1.0	1			
Belgium	post-em	1.0	1			at 3-4 leaf stage
France	pre-em	0.72 – 1.0	1		90	
Germany	pre-em	1.0				
Germany	post-em	1.0	1			up to 6-leaf stage
Greece	pre-plant	0.9-1.0				registration pending
Greece	pre-em	0.9-1.0				registration pending
Netherlands	pre-em	1.0	1			
Netherlands	post-em	1.0	1			at 2-6 leaf stage
Spain	pre-em	0.72 – 1.0				
Spain	post-em	0.72 – 1.0				
USA	pre-plant	0.63 – 1.1	1-2[1]	1.1	40 (forage)	
USA	pre-em	0.63 – 1.1	1-2[1]	1.1	40 (forage)	
USA	post-em	0.63 – 1.1	1-2[1]		40 (forage)	directed spray at lay-by (30-90 cm height)
USA	post-em	0.63 – 1.1	1-2[1]		40 (forage)	up to 30 cm height

[1]) Split applications also recommended, generally involving pre-plant or pre-emergence treatment at 50-66% recommended rate and a pre-emergence or post-emergence treatment at 33-50% recommended rate, not closer than 14 days later

Table 47. Residue data summary of supervised trials on maize in Canada, involving a single pre-plant treatment with dimethenamid.

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Canada, Ontario, 1992 (Pioneer 3962)	EC 900	0.75	Pre-plant	180	Grain	< 0.01 (4)	1993/5000184
Canada, Georgetown, 1991 (Pioneer 3897)	EC 900	1.25	Pre-plant	150	Grain	≤ 0.01 (4)	1993/5000761
Canada, Georgetown, 1991 (Pioneer 3897)	EC 900	1.25	Pre-plant	150	Grain	≤ 0.01 (4)	1993/5000761
Canada, Ontario, 1992 (Pioneer 3962)	EC 900	1.5	Pre-plant	180	Grain	≤ 0.01 (4)	1993/5000184
Canada, Georgetown, 1991 (Pioneer 3897)	EC 900	2.5	Pre-plant	150	Grain	≤ 0.01 (4)	1993/5000761
Canada, Georgetown, 1991 (Pioneer 3897)	EC 900	2.5	Pre-plant	150	Grain	≤ 0.01 (4)	1993/5000761
Canada, Ontario, 1992 (Pioneer 3962)	EC 900	3.0	Pre-plant	180	Grain	≤ 0.01 (4)	1993/5000184

Pre-plant = soil applied and shallow rotary hoe incorporation to 5-8cm just before planting

Table 48. Residue data summary of supervised trials on maize in USA, involving a single pre-plant treatment with dimethenamid.

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Sulfonate	
USA, Colorado, 1991 (Funks 4311)	EC 900	1.68	Pre-plant	160	Grain	≤ 0.01	< 0.05	1992/12434 1992/12427
USA, Illinois 1990 (NK 7686)	EC 900	1.68	Pre-plant	151	Grain	≤ 0.01	< 0.05	1992/12436 1992/12427
USA, Indiana, 1991 (Pioneer 3343)	EC 900	1.68	Pre-plant	149	Grain	≤ 0.01	< 0.05	1992/12434 1992/12427
USA, Iowa, 1990 (Pioneer 3379)	EC 720	1.68	Pre-plant	155	Grain	≤ 0.01	< 0.05	1992/12436 1992/12427
USA, Nebraska, 1990 (NC5891)	EC 900	1.68	Pre-plant	162	Grain	≤ 0.01	< 0.05	1992/12436 1992/12427
USA, New York, 1990 (Pioneer 3790)	EC 900	1.68	Pre-plant	168	Grain	≤ 0.01	< 0.05	1992/12436 1992/12427
USA, North Carolina, 1991 (Pioneer 3055)	EC 900	1.68	Pre-plant	124	Grain	≤ 0.01	< 0.05	1992/12434 1992/12427
USA, Ohio 1991 (Pioneer 3352)	EC 900	1.68	Pre-plant	139	Grain	≤ 0.01	< 0.05	1992/12434 1992/12427
USA, Ohio, 1990 (Dekalb 636)	EC 900	1.68	Pre-plant	158	Grain	≤ 0.01	< 0.05	1992/12436 1992/12427
USA, Illinois, 1991 (NK 77-51)	EC 900	1.68	Pre-plant	127	Grain	≤ 0.01	< 0.05	1992/12434 1992/12427
USA, Iowa, 1991 (Pioneer 3379)	EC 900	1.68	Pre-plant	142	Grain	≤ 0.01	< 0.05	1992/12434 1992/12427

Pre-plant = soil applied and shallow rotary hoe incorporation to 5-8cm just before planting

Table 49. Residue data summary of supervised trials on maize in Canada, involving a single pre-emergence treatment with dimethenamid.

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Canada, Ontario, 1992 (Pioneer 3962)	EC 900	0.75	Pre-em	180	Cobs	< 0.01 (4)	1993/5000184
Canada, Ontario, 1992 (Pioneer 3962)	EC 900	1.5	Pre-em	180	Cobs	< 0.01 (4)	1993/5000184
Canada, Ontario, 1992 (Pioneer 3962)	EC 900	3.0	Pre-em	180	Cobs	< 0.01 (4)	1993/5000184

'Pre-em' means pre-emergence broadcast spray

'Cobs' means kernels plus cobs, without the husks

Table 50. Residue data summary of supervised trials on maize in USA, involving a single pre-emergence treatment with dimethenamid.

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Sulfonate	
USA, Colorado, 1991 (Funks 4311)	EC 900	1.68	Pre-em	160	Grain	<u>≤ 0.01</u>	< 0.05	1992/12434 1992/12427
USA, Illinois 1990 (NK 7686)	EC 900	1.68	Pre-em	151	Grain	<u>≤ 0.01</u>	< 0.05	1992/12436 1992/12427
USA, Indiana, 1991 (Pioneer 3343)	EC 900	1.68	Pre-em	149	Grain	<u>≤ 0.01</u>	< 0.05	1992/12434 1992/12427
USA, Iowa, 1990 (Pioneer 3379)	EC 720	1.68	Pre-em	155	Grain	<u>≤ 0.01</u>	< 0.05	1992/12436 1992/12427
USA, Nebraska, 1990 (NC5891)	EC 900	1.68	Pre-em	161	Grain	<u>≤ 0.01</u>	< 0.05	1992/12436 1992/12427
USA, New York, 1990 (Pioneer 3790)	EC 900	1.68	Pre-em	167	Grain	<u>≤ 0.01</u>	< 0.05	1992/12436 1992/12427
USA, North Carolina, 1991 (Pioneer 3055)	EC 900	1.68	Pre-em	124	Grain	<u>≤ 0.01</u>	< 0.05	1992/12434 1992/12427
USA, Ohio 1991 (Pioneer 3352)	EC 900	1.68	Pre-em	139	Grain	<u>≤ 0.01</u>	< 0.05	1992/12434 1992/12427
USA, Ohio, 1990 (Dekalb 636)	EC 900	1.68	Pre-em	158	Grain	<u>≤ 0.01</u>	< 0.05	1992/12436 1992/12427
USA, Illinois, 1991 (NK 77-51)	EC 900	1.68	Pre-em	127	Grain	<u>≤ 0.01</u>	< 0.05	1992/12434 1992/12427
USA, Iowa, 1991 (Pioneer 3379)	EC 900	1.68	Pre-em	142	Grain	<u>≤ 0.01</u>	< 0.05	1992/12434 1992/12427

'Pre-em' means pre-emergence broadcast spray

Table 51. Residue data summary of supervised trials on maize in France, Germany, Greece, Italy, Spain and Switzerland, involving a single pre-emergence treatment with dimethenamid

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
France, Esbarres, 1990 (DEA)	EC 900	1.44	Pre-em	92 120 148	Cobs Grain	< 0.01, < 0.01 < 0.01, < 0.01 <u>≤ 0.01</u>, < 0.01	1991/11889

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Italy, Cervia, 1990 (Paolo)	EC 900	1.44	Pre-em	147	Grain	≤ 0.01, < 0.01	1991/11890
Italy, Ariano Polesine, 1990 (not specified)	EC 900	1.44	Pre-em	148	Grain	≤ 0.01, < 0.01	1991/11891
Italy, Castiglione di Cervia, 1990 (Luana)	EC 900	1.48	Pre-em	150	Grain	≤ 0.01, < 0.01	1991/11892
Italy, Ariano Polesine, 1990 (Prisma)	EC 900	1.42	Pre-em	148	Grain	≤ 0.01, < 0.01	1991/11893
France, Magny Les Aubigny, 1990 (DEA)	EC 900	1.49	Pre-em	142	Grain	≤ 0.01	1991/11894
France, Maison Dieu, 1990 (DK250	EC 900	1.4	Pre-em	148	Grain	≤ 0.01, < 0.01	1991/11895
France, Brazey-en-Plaine, 1990 (DEA)	EC 900	1.42	Pre-em	91 119 152	Cobs Grain	< 0.01, < 0.01 < 0.01, < 0.01 ≤ 0.01, < 0.01	1991/11896
France, Courchamps, 1990 (Anjou 29)	EC 900	1.4	Pre-em	158	Grain	≤ 0.01, < 0.01	1991/11897
Greece, Thessaloniki, 1992 (Pioneer)	EC 900	1.44	Pre-em	169	Grain	≤ 0.01, < 0.01	1993/11644
Greece, Thessaloniki, 1992 (Pioneer)	EC 900	2.88	Pre-em	169	Grain	≤ 0.01, < 0.01	1993/11644
Spain, La Algaba, 1992 (not specified)	EC 900	1.44	Pre-em	151	Grain	≤ 0.01	1993/11660
Spain, La Isla, 1992 (not specified)	EC 900	1.44	Pre-em	156	Grain	≤ 0.01	1993/11660
Spain, Palma del Rio, 1992 (not specified)	EC 900	1.44	Pre-em	155	Grain	≤ 0.01	1993/11660
Spain, Rinconada, 1992 (not specified)	EC 900	1.44	Pre-em	146	Grain	≤ 0.01	1993/11660
Switzerland, Mariastein, 1991 (Corso)	EC 900	1.44	Pre-em	120 150 168	Cobs Grain	< 0.01 < 0.01 ≤ 0.01	1994/10861
Switzerland, Sisseln, 1991 (Dea)	EC 900	1.44	Pre-em	120 150 161	Cobs Grain	< 0.01 < 0.01 ≤ 0.01	1994/10861
Germany, Bayern, 1991 (Buras)	EC 900	1.44	Pre-em	119 150 169	Cobs	< 0.01 < 0.01 < 0.01	1995/11381
France, St Denis, 1991 (Volga)	EC 900	1.49	Pre-em	146 146	Cobs Grain	< 0.01 ≤ 0.01	1997/11159
France, Luzignan Petit, 1991 (Nelson)	EC 900	1.43	Pre-em	177 177	Cobs Grain	< 0.01 ≤ 0.01	1997/11160
France, Colayrac, 1991 (Volga)	EC 900	1.41	Pre-em	145 145	Cobs Grain	< 0.01 ≤ 0.01	1997/11161

'Pre-em' means pre-emergence broadcast spray

'Cobs' means kernels plus cobs, without the husks

Table 52. Residue data summary of supervised trials on maize in Canada, involving a single post-emergence treatment with dimethenamid.

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Canada, Ontario, 1992 (Pioneer 3962)	EC 900	0.75	Post-em (12d after planting)	180	Cobs	< 0.01 (4)	1993/5000184
Canada, Ontario, 1992 (Pioneer 3962)	EC 900	1.5	Post-em (12d after planting)	180	Cobs	< 0.01 (4)	1993/5000184
Canada, Ontario, 1992 (Pioneer 3962)	EC 900	3.0	Post-em (12d after planting)	180	Cobs	< 0.01 (4)	1993/5000184

'Post-em' means post-emergence broadcast spray

'Cobs' means kernels plus cobs, without the husks

Table 53. Residue data summary of supervised trials on maize in USA, involving a single post-emergence treatment with dimethenamid.

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Sulfonate	
USA, Colorado, 1991 (Funks 4311)	EC 900	1.68	Post-em (4-5 leaf)	128	Grain	<u>≤ 0.01</u>	< 0.05	1992/12434 1992/12427[2]
USA, Illinois 1990 (NK 7686)	EC 900	1.68	Post-em (2-3 leaf)	127	Grain	<u>≤ 0.01</u>	< 0.05	1992/12436 1992/12427[3]
USA, Indiana, 1991 (Pioneer 3343)	EC 900	1.68	Post-em (4-9 leaf)	122	Grain	<u>≤ 0.01</u>	< 0.05	1992/12434 1992/12427[2]
USA, Iowa, 1990 (Pioneer 3379)	EC 720	1.68	Post-em (5-6 leaf)	118	Grain	<u>≤ 0.01</u>	< 0.05	1992/12436 1992/12427[3]
USA, Nebraska, 1990 (NC5891)	EC 900	1.68	Post-em (5-6 leaf)	122	Grain	<u>≤ 0.01</u>	< 0.05	1992/12436 1992/12427[3]
USA, New York, 1990 (Pioneer 3790)	EC 900	1.68	Post-em (4-9 leaf)	132	Grain	<u>≤ 0.01</u>	< 0.05	1992/12436 1992/12427[3]
USA, North Carolina, 1991 (Pioneer 3055)	EC 900	1.68	Post-em (5- leaf)	103	Grain	<u>≤ 0.01</u>	< 0.05	1992/12434 1992/12427[2]
USA, Ohio 1991 (Pioneer 3352)	EC 900	1.68	Post-em (2-3 leaf)	124	Grain	<u>≤ 0.01</u>	< 0.05	1992/12434 1992/12427[2]
USA, Ohio, 1990 (Dekalb 636)	EC 900	1.68	Post-em (5-leaf)	126	Grain	<u>≤ 0.01</u>	< 0.05	1992/12436 1992/12427[3]
USA, Illinois, 1991 (NK 77-51)	EC 900	1.68	Post-em (5-6 leaf)	110	Grain	<u>≤ 0.01</u>	< 0.05	1992/12434 1992/12427[2]
USA, Iowa, 1991 (Pioneer 3379)	EC 900	1.68	Post-em (5-6 leaf)	119	Grain	<u>≤ 0.01</u>	< 0.05	1992/12434 1992/12427[2]

'Post-em' means post-emergence broadcast spray

Table 54. Residue data summary of supervised trials on maize in Canada, involving a single post-emergence treatment with dimethenamid.

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Canada, Ontario, 1992 (Pioneer 3962)	EC 900	0.75	Post-em (12d after planting)	180	Cobs	< 0.01 (4)	1993/5000184
Canada, Ontario, 1992 (Pioneer 3962)	EC 900	1.5	Post-em (12d after planting)	180	Cobs	< 0.01 (4)	1993/5000184
Canada, Ontario, 1992 (Pioneer 3962)	EC 900	3.0	Post-em (12d after planting)	180	Cobs	< 0.01 (4)	1993/5000184

'Post-em' means post-emergence broadcast spray
'Cobs' means kernels plus cobs, without the husks

Table 55. Residue data summary of supervised trials on maize in Belgium, France, Germany, Greece, Italy and Netherlands, involving a single post-emergence treatment with dimethenamid

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Greece, Galatades, 1992 (Prisma)	EC 900	1.44	Post-em (1-2 leaf)	150	Grain	< 0.01, < 0.01	1993/11617
Greece, Galatades, 1992 (Prisma)	EC 900	2.88	Post-em (1-2 leaf)	150	Grain	< 0.01, < 0.01	1993/11617
Germany, Baden, 1993 (Aladin)	EC 900	1.37	Post-em (2-3 leaf)	60 90 123 151 151	Cobs Grain	< 0.01 < 0.01 < 0.01 < 0.01 ≤ 0.01	1994/10643
Germany, Bayern, 1993 (Jericho)	EC 900	1.41	Post-em (3-leaf)	90 120 149 156	Cobs Grain	< 0.01 < 0.01 < 0.01 ≤ 0.01	1994/10643
Germany, Nordrhein, 1993 (Apache)	EC 900	1.39	Post-em (3-leaf)	89 121 147 171	Cobs Grain	< 0.01 < 0.01 < 0.01 ≤ 0.01	1994/10643
Germany, Hessen, 1993 (Tau)	EC 900	1.44	Post-em (3-leaf)	60 90 120 150 151	Cobs Grain	< 0.01 < 0.01 < 0.01 < 0.01 ≤ 0.01	1994/10643
Germany, Hessen, 1991 (DEA)	EC 900	1.44	Post-em (7-9 leaf)	120 138	Cobs Grain	< 0.01 ≤ 0.01	1995/11381
Germany, Niedersachsen, 1991 (Anjou)	EC 900	1.44	Post-em (8-leaf)	120 152 165	Cobs	< 0.01 < 0.01 < 0.01	1995/11381
Belgium, Brabant, 1998 (Irene)	EC 900	1.43	Post-em (5-leaf)	118	Cobs&husks	< 0.01	1999/10005 Bridging trial

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Germany, Rheinland-Plafz, 1998 (Magelan)	EC 900	1.43	Post-em (6-leaf)	78 111	Cobs&husks Grain	< 0.01 ≤ 0.01	1999/10005 Bridging trial
Italy, Ferrara, 1998 (Fenice)	EC 900	1.37	Post-em (4-5 leaf)	93 118	Cobs&husks Grain	< 0.01 ≤ 0.01	1999/10007 Bridging trial
Italy, Cremona, 1998 (D17112A)	EC 900	1.37	Post-em (5-6 leaf)	98 122	Cobs&husks Grain	< 0.01 ≤ 0.01	1999/10007 Bridging trial
Netherlands, Limburg, 1998 (LG 2244)	EC 900	1.45	Post-em (5-leaf)	114	Cobs&husks	< 0.01	1999/10005 Bridging trial
France, St Pardon de Conques, 1998 (DK512)	EC 900	1.33	Post-em (5-leaf)	99 146	Cobs&husks Grain	< 0.01 ≤ 0.01	1999/10007 Bridging trial

'Post-em' means post emergence broadcast spray
'Cobs&husks' means kernels with both cobs and the husks
'Cobs' means kernels with cob, after removal of husks

Table 56. Residue data summary of supervised trials on maize in Belgium, France, Germany, Italy, and Netherlands, involving a single post-emergence treatment with dimethenamid-P.

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Belgium, Brabant, 1998 (Irene)	EC 720	0.99	Post-em (5-leaf)	118	Cobs&husks	< 0.01	1999/10005 Bridging trial
Germany, Rheinland-Plafz, 1998 (Magelan)	EC 720	1.0	Post-em (6-leaf)	78 111	Cobs&husks Grain	< 0.01 ≤ 0.01	1999/10005 Bridging trial
Italy, Ferrara, 1998 (Fenice)	EC 720	0.97	Post-em (4-5 leaf)	93 118	Cobs&husks Grain	< 0.01 ≤ 0.01	1999/10007 Bridging trial
Italy, Cremona, 1998 (D17112A)	EC 720	0.97	Post-em (5-6 leaf)	98 122	Cobs&husks Grain	< 0.01 ≤ 0.01	1999/10007 Bridging trial
Netherlands, Limburg, 1998 (LG 2244)	EC 720	1.09	Post-em (5-leaf)	114	Cobs&husks	< 0.01	1999/10005 Bridging trial
France, St Pardon de Conques, 1998 (DK512	EC 720	1.0	Post-em (5-leaf)	99 146	Cobs&husks Grain	< 0.01 ≤ 0.01	1999/10007 Bridging trial

'Post-em' means post emergence broadcast spray
'Cobs&husks' means kernels with both cobs and the husks
'Cobs' means kernels with cob, after removal of husks

In earlier trials on maize in USA, conducted in 1988 and 1989, dimethenamid was applied either as a single pre-plant broadcast spray, followed by shallow soil incorporation, immediately before planting, or as a single pre-emergence broadcast spray within 6 days after planting or as a single post-emergence broadcast spray when the maize plants were between the 2-leaf stage and the 9-leaf stage, between 12 and 43 days after planting. Application rates of 1.38–1.68 kg ai/ha were used in the three treatment plots. In these trials, maize plants (without roots) were sampled (as forage) about 50–60 days after planting and again at physiological maturity (as silage), with samples of grain and straw also being taken at the normal harvest time.

In the 1988 trials, samples were analysed using Method AM-0840-0790-0 to measure residues of dimethenamid and the oxalamide metabolite residues, with an LOQ of 0.01 mg/kg and recovery rates for dimethenamid of 100 ± 23% (n=6) in young plants-forage, 103 ± 17% (n=13) in plants-silage, of 90 ± 22% (n=14) in grain and 80 ± 24% (n=13) in straw at fortification levels of 0.01–0.2 mg/kg. Recovery rates for the oxalamide metabolite were 93 ± 31% (n=6) in plants-forage, 86 ± 19% (n=13) in plants-silage, of 72 ± 25% (n=14) in grain and 64 ± 25% (n=13) in straw.

In the 1989 trials, samples were also analysed for dimethenamid and the oxalamide metabolite using Method AM-0840-0790-0, but because of the variability in the recovery rates, the analysis (for dimethenamid only) was repeated (within 29 months) using Method BS2304, with an LOQ of 0.01 mg/kg and recovery rates of 94 ± 7% (n=5) for plants-forage, 88 ± 15 (n=4) for plants-silage, 90 ± 9% (n=8) for grain and 84 ± 11% (n=5) for straw at fortification levels of 0.01–0.2 mg/kg [Ref: 1992/12435].

For the oxalamide metabolite, analysed using the above method AM-0850-0291-0, the reported LOQ was 0.01 mg/kg with recovery rates of 139±43% for plants-forage, 124 ± 20% for plants-silage, 140 ± 35% for grain and 140 ± 50% for straw at a fortification levels of 0.01–0.5 mg/kg.

Table 57. Residue data summary of supervised trials on maize in USA, involving a single pre-plant treatment with dimethenamid.

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	
USA, N Carolina, 1988 (Pioneer 3320)	EC 720	1.37	Pre-plant	156	Grain	< 0.01	< 0.01	1990/11093
USA, Colorado, 1988 (Garst 8388MF)	EC 720	1.4	Pre-plant	179	Grain	< 0.01	< 0.01	1990/11093
USA, Iowa, 1988 (Pioneer 3732)	EC 720	1.57	Pre-plant	138	Grain	< 0.01	< 0.01	1990/11093
USA, Sth Dakota, 1988 (Maize 2330)	EC 720	1.57	Pre-plant	119	Grain	< 0.01	< 0.01	1990/11093
USA, Illinois, 1988 (FS2368)	EC 720	1.68	Pre-plant	133	Grain	< 0.01	< 0.01	1990/11093
USA, Illinois, 1988 (Pioneer 3377)	EC 720	1.68	Pre-plant	133	Grain	< 0.01	< 0.01	1990/11093
USA, Illinois, 1989 (Northrup King 7686)	EC 720	1.68	Pre-plant	188	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Illinois, 1989 (Northrup King 7686)[1]	EC 900	1.68	Pre-plant	188	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Indiana, 1988 (Pioneer 3377)	EC 720	1.68	Pre-plant	178	Grain	< 0.01	< 0.01	1990/11093
USA, Indiana, 1988 (Pioneer 3377)	EC 720	1.68	Pre-plant	178	Grain	< 0.01	< 0.01	1990/11093
USA, Iowa, 1988 (Dockendorf 7670)	EC 720	1.68	Pre-plant	152	Grain	< 0.01	< 0.01	1990/11093
USA, Iowa, 1989 (Pioneer 3379)	EC 720	1.68	Pre-plant	162	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Iowa, 1989 (Pioneer 3379)	EC 900	1.68	Pre-plant	162	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Minnesota, 1988 (Pioneer 3737)	EC 720	1.68	Pre-plant	140	Grain	< 0.01	< 0.01	1990/11093
USA, Minnesota, 1988 (Pioneer 3737)	EC 720	1.68	Pre-plant	140	Grain	< 0.01	< 0.01	1990/11093

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	
USA, Nebraska, 1988 (Funks G4440)	EC 720	1.68	Pre-plant	128	Grain	< 0.01	< 0.01	1990/11093
USA, New York, 1989 (Pioneer 3925)	EC 720	1.68	Pre-plant	177	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, New York, 1989 (Pioneer 3925)	EC 900	1.68	Pre-plant	177	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Ohio, 1988 Madison GL27)	EC 720	1.68	Pre-plant	161	Grain	< 0.01	< 0.01	1990/11093
USA, Oregon, 1989 (Northrup King PX39)	EC 720	1.68	Pre-plant	179	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Oregon, 1989 (Northrup King PX39)	EC 900	1.68	Pre-plant	179	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Texas, 1989 (George Warner)	EC 900	1.68	Pre-plant	127	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Wisconsin, 1988 (Pioneer 3737)	EC 720	1.68	Pre-plant	185	Grain	< 0.01	< 0.01	1990/11093
USA, Texas, 1989 (George Warner)	EC 720	1.68	Pre-plant	127	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]

Pre-plant = soil applied and shallow rotary hoe incorporation to 5-8cm just before planting

[1]) Reported dimethenamid residues are based on reanalysis of stored samples using method BS2304

Table 58. Residue data summary of supervised trials on maize in USA, involving a single pre-emergence treatment with dimethenamid.

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	
USA, Colorado, 1988 (Garst 8388MF)	EC 720	1.4	Pre-em	179	Grain	< 0.01	< 0.01	1990/11093
USA, Illinois, 1988 (FS2368)	EC 720	1.68	Pre-em	131	Grain	< 0.01	< 0.01	1990/11093
USA, Illinois, 1988 (Pioneer 3377)	EC 720	1.68	Pre-em	131	Grain	< 0.01	< 0.01	1990/11093
USA, Illinois, 1989 (Northrup King 7686)	EC 720	1.68	Pre-em	188	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Illinois, 1989 (Northrup King 7686)	EC 900	1.68	Pre-em	188	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Indiana, 1988 (Pioneer 3377)	EC 720	1.68	Pre-em	178	Grain	< 0.01	< 0.01	1990/11093
USA, Indiana, 1988 (Pioneer 3377)	EC 720	1.68	Pre-em	178	Grain	< 0.01	< 0.01	1990/11093
USA, Iowa, 1988 (Dockendorf 7670)	EC 720	1.68	Pre-em	152	Grain	< 0.01	< 0.01	1990/11093
USA, Iowa, 1988 (Pioneer 3732)	EC 720	1.57	Pre-em	138	Grain	< 0.01	< 0.01	1990/11093
USA, Iowa, 1989 (Pioneer 3379)	EC 720	1.68	Pre-em	162	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Iowa, 1989 (Pioneer 3379)	EC 900	1.68	Pre-em	162	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Minnesota, 1988 (Pioneer 3377)	EC 720	1.68	Pre-em	140	Grain	< 0.01	< 0.01	1990/11093

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	
USA, Minnesota, 1988 (Pioneer 3737)	EC 720	1.68	Pre-em	140	Grain	< 0.01	< 0.01	1990/11093
USA, Nth Carolina, 1988 (Pioneer 3320)	EC 720	1.42	Pre-em	155	Grain	< 0.01	< 0.01	1990/11093
USA, Nebraska, 1988 (Funks G4440)	EC 720	1.68	Pre-em	128	Grain	< 0.01	< 0.01	1990/11093
USA, Nebraska, 1989 (NC5891)	EC 720	1.68	Pre-em	164	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Nebraska, 1989 (NC5891)	EC 900	1.68	Pre-em	164	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, New York, 1989 (Pioneer 3925)	EC 720	1.68	Pre-em	172	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, New York, 1989 (Pioneer 3925)	EC 900	1.68	Pre-em	172	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Ohio, 1988 Madison GL27)	EC 720	1.68	Pre-em	161	Grain	< 0.01	< 0.01	1990/11093
USA, Oregon, 1989 (Northrup King PX39)	EC 720	1.68	Pre-em	179	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Oregon, 1989 (Northrup King PX39)	EC 900	1.68	Pre-em	179	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Sth Dakota, 1988 (Maize 2330)	EC 720	1.68	Pre-em	115	Grain	< 0.01	< 0.01	1990/11093
USA, Texas, 1989 (George Warner)	EC 900	1.68	Pre-em	127	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Wisconsin, 1988 (Pioneer 3737)	EC 720	1.68	Pre-em	186	Grain	< 0.01	< 0.01	1990/11093
USA, Texas, 1989 (George Warner)	EC 720	1.68	Pre-em	127	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]

'Pre-em' means pre-emergence broadcast spray

[1]) Reported dimethenamid residues are based on reanalysis of stored samples using method BS2304

Table 59. Residue data summary of supervised trials on maize in USA, involving a single post-emergence treatment with dimethenamid.

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	
USA, Illinois, 1988 (FS2368)	EC 720	1.68	Post-em (5-8cm)	120	Grain	< 0.01	< 0.01	1990/11093
USA, Illinois, 1988 (Pioneer 3377)	EC 720	1.68	Post-em (5-8cm)	120	Grain	< 0.01	< 0.01	1990/11093
USA, Illinois, 1989 (Northrup King 7686)	EC 720	1.68	Post-em (5- leaf)	161	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Illinois, 1989 (Northrup King 7686)	EC 900	1.68	Post-em (5- leaf)	161	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Indiana, 1988 (Pioneer 3377)	EC 720	1.68	Post-em (5- leaf)	144	Grain	< 0.01	< 0.01	1990/11093
USA, Indiana, 1988 (Pioneer 3377)	EC 720	1.68	Post-em (5- leaf)	144	Grain	< 0.01	< 0.01	1990/11093
USA, Iowa, 1988 (Dockendorf 7670)	EC 720	1.68	Post-em (5- leaf)	131	Grain	< 0.01	< 0.01	1990/11093

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	
USA, Iowa, 1989 (Pioneer 3379)	EC 720	1.68	Post-em (2-3 leaf)	147	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Iowa, 1989 (Pioneer 3379)	EC 900	1.68	Post-em (2-3 leaf)	147	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Minnesota, 1988 (Pioneer 3377)	EC 720	1.68	Post-em (5- leaf)	122	Grain	< 0.01	< 0.01	1990/11093
USA, Minnesota, 1988 (Pioneer 3737)	EC 720	1.68	Post-em (5- leaf)	122	Grain	< 0.01	< 0.01	1990/11093
USA, Nebraska, 1988 (Funks G4440)	EC 720	1.68	Post-em (30-36cm)	97	Grain	< 0.01	< 0.01	1990/11093
USA, Nebraska, 1989 (NC5891)	EC 720	1.68	Post-em (5-6 leaf)	133	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Nebraska, 1989 (NC5891)	EC 900	1.68	Post-em (5-6 leaf)	133	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, New York, 1989 (Pioneer 3925)	EC 720	1.68	Post-em (5-6 leaf)	135	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, New York, 1989 (Pioneer 3925)	EC 900	1.68	Post-em (5-6 leaf)	135	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Ohio, 1988 Madison GL27)	EC 720	1.68	Post-em (5-6 leaf)	127	Grain	< 0.01	< 0.01	1990/11093
USA, Oregon, 1989 (Northrup King PX39)	EC 720	1.68	Post-em (4-9 leaf)	150	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Oregon, 1989 (Northrup King PX39)	EC 900	1.68	Post-em (4-9 leaf)	150	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Sth Dakota, 1988 (Maize 2330)	EC 720	1.68	Post-em (5-6 leaf)	95	Grain	< 0.01	< 0.01	1990/11093
USA, Texas, 1989 (George Warner)	EC 900	1.68	Post-em (5-6 leaf)	105	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Wisconsin, 1988 (Pioneer 3737)	EC 720	1.68	Post-em (6-leaf)	152	Grain	< 0.01	< 0.01	1990/11093
USA, Texas, 1989 (George Warner)	EC 720	1.68	Post-em (5-6 leaf)	105	Grain	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Colorado, 1988 (Garst 8388MF)	EC 720	1.4	Post-em (5- leaf)	148	Grain	< 0.01	< 0.01	1990/11093
USA, Nth Carolina, 1988 (Pioneer 3320)	EC 720	1.38	Post-em (30-45cm)	135	Grain	< 0.01	< 0.01	1990/11093
USA, Iowa, 1988 (Pioneer 3732)	EC 720	1.57	Post-em (4-9 leaf)	95	Grain	< 0.01	< 0.01	1990/11093

'Pre-em' means pre-emergence broadcast spray

Sorghum

In trials on sorghum in USA, conducted in 1994, dimethenamid was applied to two single-replicate plots as a single pre-emergence spray within 12 days of planting, or a single post-emergence broadcast spray about 1 month after planting. An application rate of 1.68 kg ai/ha was used in all the trials.

Sorghum plants (without roots) were sampled 60–100 days after planting, generally at the late dough growth stage and both grain and straw were sampled at harvest, with all samples being analysed using Method AM-0884-0193-1 to measure dimethenamid residues, with an LOQ of 0.01 mg/kg and recovery rates of 89 ± 14% (n=8) in plants (forage), 81 ± 11% (n=5) in straw and 94 ± 11% (n=5) in grain at a fortification level of 0.01 mg/kg.

GAPs for dimethenamid-P on sorghum are:

Country	Application		Max use/season		PHI (days)	Comments
	Method	kg ai/ha	No	kg ai/ha		
France	post-em	0.86	1		90	
USA	pre-plant	0.63 – 1.1	1-2[1]	1.1	60 (green feed) 80 (grain, fodder)	
USA	pre-em	0.63 – 1.1	1-2[1]	1.1	60 (green feed) 80 (grain, fodder)	
USA	post-em	0.63 – 1.1	1-2[1]	1.1	60 (green feed) 80 (grain, fodder)	up to 30cm height

[1]) Split applications also recommended, generally involving pre-plant or pre-emergence treatment at 50-66% recommended rate and a pre-emergence or post-emergence treatment at 33-50% recommended rate, not closer than 14 days later

Table 60. Residue data summary of supervised trials on sorghum in USA, involving a single pre-emergence treatment with dimethenamid.

SORGHUM Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Colorado, 1994 (Cargill 577)	EC 900	1.68	Pre-em	136	Grain	< 0.01	1995/10781
USA, Kansas, 1994 (Hogemeyer 606)	EC 900	1.68	Pre-em	147	Grain	< 0.01	1995/10781
USA, Kansas, 1994 (Hogemeyer 688)	EC 900	1.68	Pre-em	155	Grain	< 0.01	1995/10781
USA, Kansas, 1994 (NC+ 155)	EC 900	1.68	Pre-em	113	Grain	< 0.01	1995/10781
USA, Kansas, 1994 (Pioneer 8771)	EC 900	1.68	Pre-em	121	Grain	< 0.01	1995/10781
USA, Mississippi, 1994 (Pioneer 8333)	EC 900	1.68	Pre-em	107	Grain	< 0.01	1995/10781
USA, Missouri, 1994 (Ciba 1482)	EC 900	1.68	Pre-em	111	Grain	< 0.01	1995/10781
USA, Nebraska, 1994 (Northrup King 1210)	EC 900	1.68	Pre-em	134	Grain	< 0.01	1995/10781
USA, Nebraska, 1994 (Northrup King 1210)	EC 900	1.68	Pre-em	141	Grain	< 0.01	1995/10781
USA, Oklahoma, 1994 (Triumph TR46)	EC 900	1.68	Pre-em	106	Grain	< 0.01	1995/10781
USA, Sth Dakota, 1994 (Pioneer 8855)	EC 900	1.68	Pre-em	152	Grain	< 0.01	1995/10781
USA, Texas, 1994 (G522DR)	EC 900	1.68	Pre-em	116	Grain	< 0.01	1995/10781
USA, Texas, 1994 (Pioneer 8212Y)	EC 900	1.68	Pre-em	127	Grain	< 0.01	1995/10781
USA, Texas, 1994 (TR 60G)	EC 900	1.68	Pre-em	109	Grain	< 0.01	1995/10781

Pre-em = broadcast treatment before crop has emerged

Table 61. Residue data summary of supervised trials on sorghum in USA, involving a single post-emergence treatment with dimethenamid.

SORGHUM Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Kansas, 1994 (NC+ 155)	EC 900	1.68	Post-em	90	Grain	≤ 0.01	1995/10781
USA, Texas, 1994 (G522DR)	EC 900	1.68	Post-em	84	Grain	≤ 0.01	1995/10781
USA, Kansas, 1994 (Pioneer 8771)	EC 900	1.68	Post-em	89	Grain	≤ 0.01	1995/10781
USA, Texas, 1994 (TR 60G)	EC 900	1.68	Post-em	77	Grain	≤ 0.01	1995/10781
USA, Sth Dakota, 1994 (Pioneer 8855)	EC 900	1.68	Post-em	119	Grain	< 0.01	1995/10781
USA, Colorado, 1994 (Cargill 577)	EC 900	1.68	Post-em	89	Grain	≤ 0.01	1995/10781
USA, Kansas, 1994 (Hogemeyer 606)	EC 900	1.68	Post-em	130	Grain	< 0.01	1995/10781
USA, Kansas, 1994 (Hogemeyer 688)	EC 900	1.68	Post-em	131	Grain	< 0.01	1995/10781
USA, Mississippi, 1994 (Pioneer 8333)	EC 900	1.68	Post-em	80	Grain	≤ 0.01	1995/10781
USA, Missouri, 1994 (Ciba 1482)	EC 900	1.68	Post-em	87	Grain	≤ 0.01	1995/10781
USA, Nebraska, 1994 (Northrup King 1210)	EC 900	1.68	Post-em	116	Grain	< 0.01	1995/10781
USA, Nebraska, 1994 (Northrup King 1210)	EC 900	1.68	Post-em	111	Grain	< 0.01	1995/10781
USA, Texas, 1994 (Pioneer 8212Y)	EC 900	1.68	Post-em	103	Grain	≤ 0.01	1995/10781

Post-em = broadcast spray after the crop has emerged

Peanuts

In trials on peanuts in USA, conducted in 1994, dimethenamid was applied to single-replicate plots either as a single pre-emergence spray within 9 days of planting, or a single post-emergence broadcast spray about 43–55 days after planting. An application rate of 1.68 kg ai/ha was used in all the trials. Green vines (without roots) were sampled at the time of inversion (lifting) and again at harvest time, about 5–9 days later, when the vines were combine harvested and the pods separated commercially (or simulating commercial harvest practices), the nuts subsequently being removed from the pods in the laboratory. Method AM-0884-0193-1 was used to measure dimethenamid residues, with an LOQ of 0.01 mg/kg and recovery rates of 102 ± 11% (n=26) in green vines, 105 ± 12% (n=27) in dried vines, 100 ± 10% (n=28) in shells and 93 ± 13% (n=28) in the nuts at a fortification level of 0.01 mg/kg.

GAPs for dimethenamid-P on peanuts are:

Country	Application		Max use/season		PHI (days)	Comments
	Method	kg ai/ha	No	kg ai/ha		
USA	pre-plant	0.63 – 1.1	1-2[1]	1.1	80	
USA	pre-em	0.63 – 1.1	1-2[1]	1.1	80	
USA	post-em	0.63 – 1.1	1-2[1]	1.1	80	

[1]) Split applications also recommended, generally involving pre-plant or pre-emergence treatment at 50-66% recommended rate and a pre-emergence or post-emergence treatment at 33-50% recommended rate, not closer than 14 days later

Table 62. Residue data summary of supervised trials on peanuts in USA, involving a single pre-emergence treatment with dimethenamid.

PEANUT Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Virginia, 1994 (NC-7)	EC 900	1.68	Pre-em	125+7[1]	Shells Nuts	< 0.01 ≤ 0.01	1995/10059
USA, Texas, 1994 (Tamspan 90)	EC 900	1.68	Pre-em	139+7[1]	Shells Nuts	< 0.01 ≤ 0.01	1995/10059
USA, Texas, 1994 (Spanish Starr)	EC 900	1.68	Pre-em	121+2[1]	Shells Nuts	< 0.01 ≤ 0.01	1995/10059
USA, Oklahoma, 1994 (Tamspan)	EC 900	1.68	Pre-em	127	Shells Nuts	< 0.01 ≤ 0.01	1995/10059
USA, Nth Carolina, 1994 (NC-7)	EC 900	1.68	Pre-em	127+7[1]	Shells Nuts	< 0.01 ≤ 0.01	1995/10059
USA, Georgia, 1994 (GK-7)	EC 900	1.68	Pre-em	145	Shells Nuts	< 0.01 ≤ 0.01	1995/10059
USA, Georgia, 1994 (GK-7)	EC 900	1.68	Pre-em	145	Shells Nuts	< 0.01 ≤ 0.01	1995/10059
USA, Georgia, 1994 (GK-7)	EC 900	1.68	Pre-em	133+3[1]	Shells Nuts	< 0.01 ≤ 0.01	1995/10059
USA, Georgia, 1994 (Florunner)	EC 900	1.68	Pre-em	140+4[1]	Shells Nuts	< 0.01 ≤ 0.01	1995/10059
USA, Georgia, 1994 (Florunner)	EC 900	1.68	Pre-em	140+4[1]	Shells Nuts	< 0.01 ≤ 0.01	1995/10059
USA, Georgia, 1994 (Florunner)	EC 900	1.68	Pre-em	139+5[1]	Shells Nuts	< 0.01 ≤ 0.01	1995/10059
USA, Florida, 1994 (Florunner)	EC 900	1.68	Pre-em	124+4[1]	Shells Nuts	< 0.01 ≤ 0.01	1995/10059
USA, Alabama, 1994 (Florunner)	EC 900	1.68	Pre-em	135+6[1]	Shells Nuts	< 0.01 ≤ 0.01	1995/10059
USA, Alabama, 1994 (Florunner)	EC 900	1.68	Pre-em	133+6[1]	Shells Nuts	< 0.01 ≤ 0.01	1995/10059

Samples taken at normal harvest, when vines combine-harvested and pods separated commercially (or simulated), with nuts removed from the pods in the laboratory.

[1]) No of days: plants were air dried in the field before samples taken

Table 63. Residue data summary of supervised trials on peanuts in USA, involving a single post-emergence treatment with dimethenamid.

PEANUTS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Virginia, 1994 (NC-7)	EC 900	1.68	Post-em	86+7[1]	Shells Nuts	< 0.01 ≤ 0.01	1995/10059
USA, Georgia, 1994 (GK-7)	EC 900	1.68	Post-em	88	Shells Nuts	< 0.01 ≤ 0.01	1995/10059
USA, Georgia, 1994 (GK-7)	EC 900	1.68	Post-em	88	Shells Nuts	< 0.01 ≤ 0.01	1995/10059
USA, Texas, 1994 (Spanish Starr)	EC 900	1.68	Post-em	75+2[1]	Shells Nuts	< 0.01 ≤ 0.01	1995/10059
USA, Georgia, 1994 (GK-7)	EC 900	1.68	Post-em	85+3[1]	Shells Nuts	< 0.01 ≤ 0.01	1995/10059
USA, Alabama, 1994 (Florunner)	EC 900	1.68	Post-em	87+6[1]	Shells Nuts	< 0.01 ≤ 0.01	1995/10059
USA, Texas, 1994 (Tamspan 90)	EC 900	1.68	Post-em	90+7[1]	Shells Nuts	< 0.01 ≤ 0.01	1995/10059
USA, Alabama, 1994 (Florunner)	EC 900	1.68	Post-em	84+6[1]	Shells Nuts	< 0.01 ≤ 0.01	1995/10059
USA, Oklahoma, 1994 (Tamspan)	EC 900	1.68	Post-em	80	Shells Nuts	< 0.01 ≤ 0.01	1995/10059
USA, Georgia, 1994 (Florunner)	EC 900	1.68	Post-em	90+4[1]	Shells Nuts	< 0.01 ≤ 0.01	1995/10059
USA, Georgia, 1994 (Florunner)	EC 900	1.68	Post-em	90+4[1]	Shells Nuts	< 0.01 ≤ 0.01	1995/10059
USA, Florida, 1994 (Florunner)	EC 900	1.68	Post-em	75+4[1]	Shells Nuts	< 0.01 ≤ 0.01	1995/10059
USA, Nth Carolina, 1994 (NC-7)	EC 900	1.68	Post-em	83+7[1]	Shells Nuts	< 0.01 ≤ 0.01	1995/10059
USA, Georgia, 1994 (Florunner)	EC 900	1.68	Post-em	84+5[1]	Shells Nuts	< 0.01 ≤ 0.01	1995/10059

Samples taken at normal harvest, when vines combine-harvested and pods separated commercially (or simulated), with nuts removed from the pods in the laboratory.

[1]) No of days plants were air dried in the field before samples taken

Bean fodder and forage

Details of the residue trial designs and analytical methodologies used in the supervised residue trials summarized below are included in the previous section relating to beans, dry.

GAPs for dimethenamid-P on beans, dry are:

Country	Application		Max use/season		PHI (days)	Comments
	Method	kg ai/ha	No	kg ai/ha		
USA	pre-plant	0.63 – 1.1	1-2[1]	1.1	70 (beans)	
USA	pre-em	0.63 – 1.1	1-2[1]	1.1	70 (beans)	
USA	post-em	0.63 – 1.1	1-2[1]		70 (beans)	from 1-3 leaf stage not garbanzo beans, lentils

[1]) Split applications also recommended, generally involving pre-plant or pre-emergence treatment at 50-66% recommended rate and a pre-emergence or post-emergence treatment at 33-50% recommended rate, not closer than 14 days later

Table 64. Residue data summary of supervised trials on bean forage and fodder in USA and Canada, involving a single pre-plant treatment with dimethenamid.

BEANS, DRY Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Canada, Ontario, 1994 (OAC Gryphon) White beans	EC 900	1.29	Pre-plant	38 69 113	Forage Fodder	< 0.02 (4) ≤ 0.02 (4) ≤ 0.02 (4)	1995/500029
Canada, Ontario, 1994 (Stinger) White beans	EC 900	1.33	Pre-plant	36 67 108	Forage Fodder	< 0.02 (4) ≤ 0.02 (4) ≤ 0.02 (4)	1990/11093
USA, California, 1994 (Yolano Pink)	EC 900	1.68	Pre-plant	52 73 93+5[1]	Forage Fodder	< 0.01 ≤ 0.01 ≤ 0.01	1995/10509
Canada, Ontario, 1994 (Stinger) White beans	EC 900	2.63	Pre-plant	36 67 108	Forage Fodder	< 0.02 (4) ≤ 0.02 (4) ≤ 0.02 (4)	1990/11093
Canada, Ontario, 1994 (OAC Gryphon) White beans	EC 900	2.66	Pre-plant	38 69 113	Forage Fodder	< 0.02 (4) ≤ 0.02 (4) ≤ 0.02 (4)	1995/500029

'Forage' = the entire plant without roots

'Fodder' = the mature plant after harvesting the beans, but including empty pods

[1]) Mature plants cut and air-dried for 5 days before sampling

Table 65. Residue data summary of supervised trials on bean forage and fodder in USA and Canada, involving a single pre-emergence treatment with dimethenamid.

BEANS, DRY Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Canada, Ontario, 1994 (OAC Gryphon) White beans	EC 900	1.27	Pre-em	30 61 105	Forage Fodder	< 0.02 (4) ≤ 0.02 (4) ≤ 0.02 (4)	1995/500029
Canada, Ontario, 1994 (Stinger) White beans	EC 900	1.29	Pre-em	30 61 102	Forage Fodder	0.04 < 0.02 (3) ≤ 0.02 (4) ≤ 0.02 (4)	1990/11093
USA, Colorado, 1994 (Bill Z) Pinto beans	EC 900	1.68	Pre-em	37 84 101	Forage Fodder	< 0.01 ≤ 0.01 ≤ 0.01	1995/10509
USA, Idaho, 1994 (Topaz) Pinto beans	EC 900	1.68	Pre-em	46 91 133	Forage Fodder	< 0.01 ≤ 0.01 ≤ 0.01	1995/10509
USA, Michigan, 1994 (Midland Navy) Navy beans	EC 900	1.68	Pre-em	41 66 99	Forage Fodder	< 0.01 ≤ 0.01 ≤ 0.01	1995/10509

BEANS, DRY Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Michigan, 1994 (not specified)	EC 900	1.68	Pre-em	40 81 124	Forage Fodder	< 0.01 ≤ 0.01 ≤ 0.01	1995/10509
USA, Minnesota, 1994 (Upland) Navy beans	EC 900	1.68	Pre-em	55 83 116	Forage Fodder	< 0.01 ≤ 0.01 ≤ 0.01	1995/10509
USA, Nebraska, 1994 (Marquis)	EC 900	1.68	Pre-em	44 68 97	Forage Fodder	< 0.01 ≤ 0.01 ≤ 0.01	1995/10509
USA, Nebraska, 1994 (not specified)	EC 900	1.68	Pre-em	44 78 102	Forage Fodder	< 0.01 ≤ 0.01 ≤ 0.01	1995/10509
USA, New York, 1994 (Gold Seal Horizon Light)	EC 900	1.68	Pre-em	37 73 93+6[1]	Forage Fodder	< 0.01 ≤ 0.01 ≤ 0.01	1995/10509g
USA, Nth Dakota, 1994 (Topaz) Pinto beans	EC 900	1.68	Pre-em	46 89 120	Forage Fodder	< 0.01 ≤ 0.01 ≤ 0.01	1995/10509
USA, Nth Dakota, 1994 (Topaz) Pinto beans	EC 900	1.68	Pre-em	45 89 119	Forage Fodder	< 0.01 ≤ 0.01 ≤ 0.01	1995/10509
USA, Nth Dakota, 1994 (Upland) Navy beans	EC 900	1.68	Pre-em	46 89 122	Forage Fodder	< 0.01 ≤ 0.01 ≤ 0.01	1995/10509
USA, Washington, 1994 (Brewer) Lentils	EC 900	1.68	Pre-em	44 70 76	Forage Fodder	< 0.01 ≤ 0.01 ≤ 0.01	1995/10509
USA, Wyoming, 1994 (Nodak) Pinto beans	EC 900	1.68	Pre-em	38 85 99	Forage Fodder	< 0.01 ≤ 0.01 ≤ 0.01	1995/10509
Canada, Ontario, 1994 (OAC Gryphon) White beans	EC 900	2.53	Pre-em	30 61 105	Forage Fodder	< 0.02 (4) ≤ 0.02 (4) ≤ 0.02 (4)	1995/500029
Canada, Ontario, 1994 (Stinger) White beans	EC 900	2.63	Pre-em	30 61 102	Forage Fodder	< 0.02 (4) ≤ 0.02 (4) ≤ 0.02 (4)	1990/11093

'Forage' = the entire plant without roots
'Fodder' = the mature plant except beans, but including empty pods
[1]) Mature plants cut and air-dried for 6 days before sampling

Table 66. Residue data summary of supervised trials on bean forage and fodder in USA, involving a single post-emergence treatment with dimethenamid.

BEANS, DRY Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, California, 1994 (Yolano Pink)	EC 900	1.68	Post-em	42 63 83+5[1]	Forage Fodder	< 0.01 < 0.01 < 0.01	1995/10509
USA, Colorado, 1994 (Bill Z) Pinto beans	EC 900	1.68	Post-em	12 59 76	Forage Fodder	0.03 < 0.01 < 0.01	1995/10509
USA, Idaho, 1994 (Topaz) Pinto beans	EC 900	1.68	Post-em	42 87 129	Forage Fodder	< 0.01 < 0.01 < 0.01	1995/10509
USA, Michigan, 1994 (Midland Navy) Navy beans	EC 900	1.68	Post-em	20 45 78	Forage Fodder	< 0.01 < 0.01 < 0.01	1995/10509
USA, Michigan, 1994 (not specified)	EC 900	1.68	Post-em	13 54 97	Forage Fodder	< 0.01 < 0.01 < 0.01	1995/10509
USA, Minnesota, 1994 (Upland) Navy beans	EC 900	1.68	Post-em	12 40 73	Forage Fodder	0.03 < 0.01 < 0.01	1995/10509
USA, Nebraska, 1994 (Marquis)	EC 900	1.68	Post-em	24 48 77	Forage Fodder	< 0.01 < 0.01 < 0.01	1995/10509
USA, Nebraska, 1994 (not specified)	EC 900	1.68	Post-em	26 60 84	Forage Fodder	< 0.01 < 0.01 < 0.01	1995/10509
USA, New York, 1994 (Gold Seal Horizon Light)	EC 900	1.68	Post-em	17 53 73+6[1]	Forage Fodder	< 0.01 < 0.01 < 0.01	1995/10509
USA, Nth Dakota, 1994 (Topaz) Pinto beans	EC 900	1.68	Post-em	20 63 94	Forage Fodder	< 0.01 < 0.01 < 0.01	1995/10509
USA, Nth Dakota, 1994 (Topaz) Pinto beans	EC 900	1.68	Post-em	19 63 93	Forage Fodder	< 0.01 < 0.01 < 0.01	1995/10509
USA, Nth Dakota, 1994 (Upland) Navy beans	EC 900	1.68	Post-em 20cm height	20 63 96	Forage Fodder	< 0.01 < 0.01 < 0.01	1995/10509
USA, Washington, 1994 (Brewer) Lentils	EC 900	1.68	Post-em 20cm height	33 59 65	Forage Fodder	< 0.01 < 0.01 < 0.01	1995/10509

BEANS, DRY Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Wyoming, 1994 (Nodak) Pinto beans	EC 900	1.68	Post-em	18 65 79	Forage Fodder	0.06 < 0.01 < 0.01	1995/10509

'Forage' = the entire immature plant without roots
'Fodder' = the whole plant except beans, but including empty pods, at harvest time
[1]) Mature plants cut and air-dried for 5-6 days before sampling

Peanut forage and fodder

Details of the residue trial designs and analytical methodologies used in the supervised residue trials summarized below are included in the previous section relating to peanuts.

GAPs for dimethenamid-P on peanuts are:

Country	Application		Max use/season		PHI (days)	Comments
	Method	kg ai/ha	No	kg ai/ha		
USA	pre-plant	0.63 – 1.1	1-2[1]	1.1	80	
USA	pre-em	0.63 – 1.1	1-2[1]	1.1	80	
USA	post-em	0.63 – 1.1	1-2[1]	1.1	80	

[1]) Split applications also recommended, generally involving pre-plant or pre-emergence treatment at 50-66% recommended rate and a pre-emergence or post-emergence treatment at 33-50% recommended rate, not closer than 14 days later.

Table 67. Residue data summary of supervised trials on peanut forage and fodder in USA, involving a single pre-emergence treatment with dimethenamid.

PEANUT Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Virginia, 1994 (NC-7)	EC 900	1.68	Pre-em	125 125+7[1]	Forage Fodder	< 0.01 < 0.01	1995/10059
USA, Texas, 1994 (Tamspan 90)	EC 900	1.68	Pre-em	132 139+7[1]	Forage Fodder	< 0.01 < 0.01	1995/10059
USA, Texas, 1994 (Spanish Starr)	EC 900	1.68	Pre-em	121 121+2[1]	Forage Fodder	< 0.01 < 0.01	1995/10059
USA, Oklahoma, 1994 (Tamspan)	EC 900	1.68	Pre-em	125 127	Forage Fodder	< 0.01 < 0.01	1995/10059
USA, Nth Carolina, 1994 (NC-7)	EC 900	1.68	Pre-em	127 127+7[1]	Forage Fodder	< 0.01 < 0.01	1995/10059
USA, Georgia, 1994 (GK-7)	EC 900	1.68	Pre-em	136 145	Forage Fodder	< 0.01 < 0.01	1995/10059
USA, Georgia, 1994 (GK-7)	EC 900	1.68	Pre-em	136 145	Forage Fodder	< 0.01 < 0.01	1995/10059

PEANUT Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Georgia, 1994 (GK-7)	EC 900	1.68	Pre-em	133 133+3[1]	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10059
USA, Georgia, 1994 (Florunner)	EC 900	1.68	Pre-em	140 140+4[1]	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10059
USA, Georgia, 1994 (Florunner)	EC 900	1.68	Pre-em	140 140+4[1]	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10059
USA, Georgia, 1994 (Florunner)	EC 900	1.68	Pre-em	139 139+5[1]	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10059
USA, Florida, 1994 (Florunner)	EC 900	1.68	Pre-em	124 124+4[1]	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10059
USA, Alabama, 1994 (Florunner)	EC 900	1.68	Pre-em	135 135+6[1]	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10059
USA, Alabama, 1994 (Florunner)	EC 900	1.68	Pre-em	133 133+6[1]	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10059

'Forage' means the vines (without roots) sampled before peanut inverting – lifting

'Fodder' means the vines (without pods) sampled at normal harvest, after drying in the field

[1]) No of days: plants were air dried in the field before samples taken

Table 68. Residue data summary of supervised trials on peanut forage and fodder in USA, involving a single post-emergence treatment with dimethenamid.

PEANUTS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Virginia, 1994 (NC-7)	EC 900	1.68	Post-em	86 86+7[1]	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10059
USA, Georgia, 1994 (GK-7)	EC 900	1.68	Post-em	79 88	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10059
USA, Georgia, 1994 (GK-7)	EC 900	1.68	Post-em	79 88	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10059
USA, Texas, 1994 (Spanish Starr)	EC 900	1.68	Post-em	75 75+2[1]	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10059
USA, Georgia, 1994 (GK-7)	EC 900	1.68	Post-em	85 85+3[1]	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10059
USA, Alabama, 1994 (Florunner)	EC 900	1.68	Post-em	87 87+6[1]	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10059
USA, Texas, 1994 (Tamspan 90)	EC 900	1.68	Post-em	83 90+7[1]	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10059
USA, Alabama, 1994 (Florunner)	EC 900	1.68	Post-em	84 84+6[1]	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10059

PEANUTS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Oklahoma, 1994 (Tamspan)	EC 900	1.68	Post-em	78 80	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10059
USA, Georgia, 1994 (Florunner)	EC 900	1.68	Post-em	90 90+4[1]	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10059
USA, Georgia, 1994 (Florunner)	EC 900	1.68	Post-em	90 90+4[1]	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10059
USA, Florida, 1994 (Florunner)	EC 900	1.68	Post-em	75 75+4[1]	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10059
USA, Nth Carolina, 1994 (NC-7)	EC 900	1.68	Post-em	83 83+7[1]	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10059
USA, Georgia, 1994 (Florunner)	EC 900	1.68	Post-em	84 84+5[1]	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10059

'Forage' means the vines (without roots) sampled before peanut inverting – lifting

'Fodder' means the vines (without pods) sampled at normal harvest, after drying in the field

[1]) No of days: plants were air dried in the field before samples taken

Soya bean forage and fodder

Details of the residue trial designs and analytical methodologies used in the supervised residue trials summarized below are included in the previous section relating to soya beans.

GAPs for dimethenamid-P on soya beans provided to the meeting all specify that treated soya bean forage, fodder (hay and straw) should not be grazed or fed to livestock.

Country	Application		Max use/season		PHI (days)	Comments
	Method	kg ai/ha	No	kg ai/ha		
USA	pre-plant	0.63 – 1.1	1-2[1]	1.1	not for animal feed	
USA	pre-em	0.63 – 1.1	1-2[1]	1.1	not for animal feed	
USA	post-em	0.63 – 1.1	1-2[1]	1.1	not for animal feed	from 1-3 leaf stage

[1]) Split applications also recommended, generally involving pre-plant or pre-emergence treatment at 50-66% recommended rate and a pre-emergence or post-emergence treatment at 33-50% recommended rate, not closer than 14 days later.

Table 69. Residue data summary of supervised trials on soya bean forage and fodder in USA and Canada, involving a single pre-plant treatment with dimethenamid.

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Canada, Ontario, 1992 (Not stated)	EC 900	0.75	Pre-plant	30 60 162	Forage Fodder	< 0.01 (4) < 0.01 (4) < 0.01 (4)	1993/5000022

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Canada, Ontario, 1991 (Pioneer 9061)	EC 900	1.25	Pre-plant	60 90 140	Forage Fodder	< 0.01 (4) < 0.01 (4) < 0.01 (4)	1993/5000022
Canada, Ontario, 1992 (Not stated)	EC 900	1.5	Pre-plant	30 60 162	Forage Fodder	< 0.01 (4) < 0.01 (4) < 0.01 (4)	1993/5000022
USA, Illinois, 1992 (Northrup King 523-12)	EC 900	1.68	Pre-plant	48 106 114	Forage Fodder	< 0.01 < 0.01 < 0.01	1993/11796
USA, Illinois, 1992 (S28-18)	EC 900	1.68	Pre-plant	57 124 160	Forage Fodder	0.011 (c=0.006) < 0.01 < 0.01	1993/11796
USA, Indiana, 1992 (Williams 82)	EC 900	1.68	Pre-plant	56 123 134	Forage Fodder	< 0.01 < 0.01 < 0.01	1993/11796
USA, Iowa, 1992 (Stine 2255	EC 900	1.68	Pre-plant	52 109 137	Forage Fodder	< 0.01 < 0.01 < 0.01	1993/11796
USA, Iowa, 1992 (Stine 2255)	EC 900	1.68	Pre-plant	61 118 145	Forage Fodder	< 0.01 < 0.01 < 0.01	1993/11796
USA, Mississippi, 1992 (Hutcheson)	EC 900	1.68	Pre-plant	40 86 114	Forage Fodder	< 0.01 < 0.01 < 0.01	1993/11796
USA, Missouri, 1992 (Williams 82)	EC 900	1.68	Pre-plant	55 103 140	Forage Fodder	< 0.01 < 0.01 < 0.01	1993/11796
Canada, Ontario, 1991 (Pioneer 9061)	EC 900	2.5	Pre-plant	60 90 140	Forage Fodder	< 0.01 (4) < 0.01 (4) < 0.01 (4)	1993/5000022
Canada, Ontario, 1992 (Not stated)	EC 900	3.0	Pre-plant	30 60 162	Forage Fodder	< 0.01 (4) < 0.01 (4) < 0.01 (4)	1993/5000022

'Fodder' = entire plant without roots

'Forage' = mature plants at harvest, after removal of seeds by combine harvester

Pre-plant = soil applied and shallow rotary hoe incorporation to 5-8cm just before planting

Table 70. Residue data summary of supervised trials on soya bean forage and fodder in USA and Canada, involving a single pre-emergence treatment with dimethenamid.

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Canada, Ontario, 1991 (Not stated)	EC 900	0.75	Pre-em	30 60 155	Forage Fodder	< 0.01 (4) < 0.01 (4) < 0.01 (4)	1993/5000022
Canada, Ontario, 1992 (King Grain 41)	EC 900	0.76	Pre-em	31 60 169	Forage Fodder	< 0.02 (4) < 0.02 (4) < 0.02 (4)	1997/5790
Canada, Ontario, 1992 (King Grain 60)	EC 900	0.76	Pre-em	31 60 169	Forage Fodder	< 0.02 (4) < 0.02 (4) < 0.02 (4)	1997/5790
Canada, Ontario, 1991 (Not stated)	EC 900	1.25	Pre-em	60 90	Forage	< 0.01 (4) < 0.01 (4)	1993/5000022
Canada, Ontario, 1991 (Not stated)	EC 900	1.25	Pre-em	60 90 120	Forage Fodder	< 0.01 (4) < 0.01 (4) < 0.01 (4)	1993/5000022
Canada, Ontario, 1991 (Not stated)	EC 900	1.25	Pre-em	60 90 132	Forage Fodder	< 0.01 (4) < 0.01 (4) < 0.01 (4)	1993/5000022
Canada, Ontario, 1992 (King Grain 41)	EC 900	1.5	Pre-em	31 60 169	Forage Fodder	< 0.02 (4) < 0.02 (4) < 0.02 (4)	1997/5790
Canada, Ontario, 1992 (King Grain 60)	EC 900	1.5	Pre-em	31 60 169	Forage Fodder	< 0.02 (4) < 0.02 (4) < 0.02 (4)	1997/5790
Canada, Ontario, 1991 (Not stated)	EC 900	1.5	Pre-em	30 60 155	Forage Fodder	< 0.01 (4) < 0.01 (4) < 0.01 (4)	1993/5000022
USA, Illinois, 1992 (Northrup King 523-12)	EC 900	1.68	Pre-em	48 106 114	Forage Fodder	< 0.01 < 0.01 < 0.01	1993/11796
USA, Illinois, 1992 (S28-18)	EC 900	1.68	Pre-em	57 124 160	Forage Fodder	< 0.01 < 0.01 < 0.01	1993/11796
USA, Indiana, 1992 (Williams 82)	EC 900	1.68	Pre-em	56 123 134	Forage Fodder	< 0.01 < 0.01 < 0.01	1993/11796
USA, Iowa, 1992 (Stine 2255	EC 900	1.68	Pre-em	52 109 137	Forage Fodder	< 0.01 < 0.01 < 0.01	1993/11796

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Iowa, 1992 (Stine 2255)	EC 900	1.68	Pre-em	61 118 145	Forage Fodder	< 0.01 < 0.01 < 0.01	1993/11796
USA, Mississippi, 1992 (Hutcheson)	EC 900	1.68	Pre-em	37 83 111	Forage Fodder	< 0.01 < 0.01 < 0.01	1993/11796
USA, Missouri, 1992 (Williams 82)	EC 900	1.68	Pre-em	55 103 140	Forage Fodder	< 0.01 < 0.01 < 0.01	1993/11796
Canada, Ontario, 1991 (Not stated)	EC 900	2.5	Pre-em	60 90	Forage	< 0.01 (4) < 0.01 (4)	1993/5000022
Canada, Ontario, 1992 (King Grain 41)	EC 900	2.9	Pre-em	31 60 169	Forage Fodder	< 0.02 (4) < 0.02 (4) < 0.02 (4)	1997/5790
Canada, Ontario, 1992 (King Grain 60)	EC 900	2.9	Pre-em	31 60 169	Forage Fodder	< 0.02 (4) < 0.02 (4) < 0.02 (4)	1997/5790
Canada, Ontario, 1991 (Not stated)	EC 900	3.0	Pre-em	30 60 155	Forage Fodder	0.02, < 0.01 (3) < 0.01 (4) < 0.01 (4)	1993/5000022

'Forage' – the entire immature plant without roots
'Fodder' = the mature plant at harvest, after removal of seeds by combine harvester
Pre-em = pre-emergence broadcast spray application

Table 71. Residue data summary of supervised trials on soya bean forage and fodder in USA, involving a single post-emergence treatment with dimethenamid.

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Illinois, 1992 (Northrup King 523-12)	EC 900	1.68	Post-em	33 91 99	Forage Fodder	< 0.01 < 0.01 < 0.01	1993/11796
USA, Illinois, 1992 (S28-18)	EC 900	1.68	Post-em	39 106 142	Forage Fodder	0.011 (c=0.006) < 0.01 < 0.01	1993/11796
USA, Illinois, 1993 (Pioneer 9273)	EC 900	1.68	Post-em	15 80 108	Forage Fodder	0.012 < 0.01 < 0.01	1994/11282
USA, Indiana, 1992 (Williams 82)	EC 900	1.68	Post-em	38 105 127	Forage Fodder	< 0.01 < 0.01 < 0.01	1993/11796

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Iowa, 1992 (Stine 2255	EC 900	1.68	Post-em	34 91 119	Forage Fodder	< 0.01 < 0.01 < 0.01	1993/11796
USA, Iowa, 1992 (Stine 2255)	EC 900	1.68	Post-em	35 92 119	Forage Fodder	< 0.01 < 0.01 < 0.01	1993/11796
USA, Kansas, 1993 (Terra Cycle)	EC 900	1.68	Post-em	18 67 140	Forage Fodder	< 0.01 < 0.01 0.01	1994/11282
USA, Louisiana, 1993 (HSC B2J)	EC 900	1.68	Post-em	10 42 90	Forage Fodder	< 0.01 < 0.01 < 0.01	1994/11282
USA, Minnesota, 1993 (Evans)	EC 900	1.68	Post-em	16 78 107	Forage Fodder	< 0.01 < 0.01 < 0.01	1994/11282
USA, Mississippi, 1992 (Hutcheson)	EC 900	1.68	Post-em	25 71 99	Forage Fodder	< 0.01 < 0.01 < 0.01	1993/11796
USA, Missouri, 1992 (Williams 82)	EC 900	1.68	Post-em	29 77 114	Forage Fodder	< 0.01 < 0.01 < 0.01	1993/11796
USA, North Carolina, 1993 (Brim)	EC 900	1.68	Post-em	11 163	Forage	0.02 < 0.01	1994/11282
USA, Ohio, 1993 (Madison Seed GL2910)	EC 900	1.68	Post-em	7 63 90	Forage Fodder	0.02 < 0.01 < 0.01	1994/11282
USA, South Dakota, 1993 (Corsoy 79)	EC 900	1.68	Post-em	11 67 97	Forage Fodder	0.02 < 0.01 < 0.01	1994/11282
USA, Tennessee, 1993 (Pioneer 9551)	EC 900	1.68	Post-em	8 81 119	Forage Fodder	0.01 < 0.01 < 0.01	1994/11282

'Forage' = the entire plant without roots
'Fodder' = the mature plant at harvest, after removal of seeds by combine harvester
'Post-em' = post-emergence broadcast spray at crop 2-4-leaf growth stage

Table 72. Residue data summary of supervised trials on soya bean forage and fodder in USA, involving a single pre-plant treatment with dimethenamid.

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Sulfonate	
USA, Kansas, 1991 (Pioneer 9272)	EC 900	1.68	Pre-plant	42 93 111	Forage Fodder	< 0.01 < 0.01 < 0.01	- < 0.1 < 0.1	1992/12442 1993/11797[1]
USA, Georgia, 1991 (HSC 721)	EC 900	1.68	Pre-plant	40 103 149	Forage Fodder	< 0.01 < 0.01 < 0.01	0.37 0.14 < 0.05	1992/12442 1993/11797[1]
USA, Indiana, 1991 (Pioneer 9303)	EC 900	1.68	Pre-plant	36 100 156	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.2 < 0.1 < 0.1	1992/12442 1993/11797[1]
USA, Maryland, 1991 (Union Beans)	EC 900	1.68	Pre-plant	34 91 116	Forage Fodder	< 0.01 < 0.01 < 0.01	0.33 0.35 0.13	1992/12442 1993/11797[1]
USA, Minnesota, 1991 (Glenwood)	EC 900	1.68	Pre-plant	43 97 112	Forage Fodder	0.01 < 0.01 < 0.01	< 0.2 < 0.1 < 0.1	1992/12442 1993/11797[1]
USA, Nebraska, 1991 (NC 3M28)	EC 900	1.68	Pre-plant	55 113 135	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.2 < 0.1 	1992/12442 1993/11797[1]
USA, Ohio, 1991 (Pioneer 9361)	EC 900	1.68	Pre-plant	41 111 125	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.2 < 0.1 < 0.1	1992/12442 1993/11797[1]

'Forage' = the entire immature plant without roots
'Fodder' means the mature plants at harvest, after removal of beans by combine harvester
Pre-plant = soil applied and shallow rotary hoe incorporation to 5-8cm just before planting
[1]) Reanalysis of stored forage, fodder samples for the sulfonate metabolite

Table 73. Residue data summary of supervised trials on soya bean forage and fodder in USA, involving a single pre-emergence treatment with dimethenamid.

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Sulfonate	
USA, Georgia, 1991 (HSC 721)	EC 900	1.68	Pre-em	40 103 149	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.2 < 0.1 	1992/12442 1993/11797[1]
USA, Indiana, 1991 (Pioneer 9303)	EC 900	1.68	Pre-em	36 100 156	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.2 < 0.1 < 0.1	1992/12442 1993/11797[1]
USA, Kansas, 1991 (Pioneer 9272)	EC 900	1.68	Pre-em	42 93 111	Forage Fodder	< 0.01 < 0.01 < 0.01	- < 0.1 < 0.1	1992/12442 1993/11797[1]

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Sulfonate	
USA, Maryland, 1991 (Union Beans)	EC 900	1.68	Pre-em	34 91 116	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.2 < 0.1 < 0.1	1992/12442 1993/11797[1]
USA, Minnesota, 1991 (Glenwood)	EC 900	1.68	Pre-em	43 97 112	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.2 < 0.1 < 0.1	1992/12442 1993/11797[1]
USA, Nebraska, 1991 (NC 3M28)	EC 900	1.68	Pre-em	54 112 134	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.2 < 0.1 	1992/12442 1993/11797[1]
USA, Ohio, 1991 (Pioneer 9361)	EC 900	1.68	Pre-em	41 111 125	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.2 < 0.1 < 0.1	1992/12442 1993/11797[1]

'Forage' means entire plant without roots
'Fodder' means the mature plants at harvest, after removal of seeds by combine harvester
Pre-em = pre-emergence broadcast spray
[1]) Reanalysis of stored forage, fodder samples for the sulfonate metabolite

Table 74. Residue data summary of supervised trials on soya bean forage and fodder in USA, involving a single post-emergence treatment with dimethenamid.

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Sulfonate	
USA, Georgia, 1991 (HSC 721)	EC 900	1.68	Post-em 2-leaf	27 90 136	Forage Fodder	< 0.01 < 0.01 < 0.01	0.28 < 0.1 	1992/12442 1993/11797[1]
USA, Indiana, 1991 (Pioneer 9303)	EC 900	1.68	Post-em 2-leaf	25 89 145	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.2 < 0.1 < 0.1	1992/12442 1993/11797[1]
USA, Kansas, 1991 (Pioneer 9272)	EC 900	1.68	Post-em 2-leaf	31 82 100	Forage Fodder	< 0.01 < 0.01 < 0.01	- < 0.1 < 0.1	1992/12442 1993/11797[1]
USA, Maryland, 1991 (Union Beans)	EC 900	1.68	Post-em 2-leaf	22 79 104	Forage Fodder	< 0.01 < 0.01 < 0.01	0.23 0.17 0.14	1992/12442 1993/11797[1]
USA, Minnesota, 1991 (Glenwood)	EC 900	1.68	Post-em 2-leaf	24 78 93	Forage Fodder	0.011 (c=0.006) < 0.01 < 0.01	< 0.2 < 0.1 < 0.1	1992/12442 1993/11797[1]
USA, Nebraska, 1991 (NC 3M28)	EC 900	1.68	Post-em 2-leaf	41 99 121	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.2 < 0.1 	1992/12442 1993/11797[1]
USA, Ohio, 1991 (Pioneer 9361)	EC 900	1.68	Post-em 2-leaf	26 96 110	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.2 < 0.1 < 0.1	1992/12442 1993/11797[1]

'Forage' means entire immature plant without roots

'Fodder' means the mature plants at harvest, after removal of seeds by combine harvester
Post-em = post emergence broadcast spray applied when plants were about the 2-leaf stage
[1]) Reanalysis of stored forage, fodder samples for the sulfonate metabolite

Table 75. Residue data summary of supervised trials on soya bean forage and fodder in USA, involving a single pre-plant treatment with dimethenamid.

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)			Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	Sulfonate	
USA, Arkansas, 1990 (Hyperformer HSC-B2J)	EC 900	1.68	Pre-plant	49 96	Forage	< 0.01 < 0.01	0.06 0.02	- < 0.1	1991/11823 1992/12443[1] 1993/11797[2]
USA, Minnesota, 1990 (Glenwood SB)	EC 900	1.68	Pre-plant	54 103 126	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.02 < 0.02 < 0.02	< 0.2 - < 0.1	1991/11823 1992/12443[1] 1993/11797[2]
USA, Nth Carolina 1990 (Deltapine 416)	EC 900	1.68	Pre-plant	40 103 158	Forage Fodder	< 0.01 < 0.01 < 0.01	0.17 < 0.02 < 0.02	< 0.2 < 0.1 < 0.1	1991/11823 1992/12443[1] 1993/11797[2]
USA, Ohio 1990 (Dekalb CX415)	EC 900	1.68	Pre-plant	53 111 154	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.02 < 0.02 < 0.02	< 0.2 < 0.1 < 0.1	1991/11823 1992/12443[1] 1993/11797[2]
USA, Illinois, 1990 (NK 2920)	EC 900	1.68	Pre-plant	36 102 137	Forage Fodder	< 0.01 < 0.01 < 0.01	0.03 < 0.02 < 0.02	< 0.2 < 0.1 < 0.1	1991/11823 1992/12443[1] 1993/11797[2]
USA, Arkansas, 1989 (Shiloh)	EC 720	1.68	Pre-plant	97 178	Forage Fodder	< 0.02 < 0.02	0.04 < 0.02	< 0.1	1991/11899
USA, Georgia, 1989 (Wright)	EC 720	1.68	Pre-plant	43 120 172	Forage Fodder	< 0.02 < 0.02 < 0.02	0.28 < 0.02 0.03	0.55	1991/11899
USA, Georgia, 1989 (Wright)	EC 900	1.68	Pre-plant	43 120 172	Forage Fodder	< 0.02 < 0.02 < 0.02	0.12 0.02 < 0.02	0.27 < 0.1	1991/11899
USA, Iowa 1989 (Stine 2770)	EC 720	1.68	Pre-plant	60 101 143	Forage Fodder	< 0.02 < 0.02 < 0.02	0.02 < 0.02 < 0.02	< 0.05	1991/11899
USA, Iowa 1989 (Stine 2770)	EC 900	1.68	Pre-plant	60 101 143	Forage Fodder	< 0.02 < 0.02 < 0.02	0.02 < 0.02 < 0.02	< 0.05	1991/11899
USA, Louisiana, 1989 (Coker 485)	EC 900	1.68	Pre-plant	37 73 104	Forage Fodder	< 0.02 < 0.02 < 0.02	0.06 < 0.02 0.19	 0.3	1991/11899

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)			Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	Sulfonate	
USA, Minnesota 1989 (Glenwood SB)	EC 720	1.68	Pre-plant	48 105 134	Forage Fodder	< 0.02 < 0.02 < 0.02	< 0.02 < 0.02 < 0.02		1991/11899
USA, Minnesota 1989 (Glenwood SB)	EC 900	1.68	Pre-plant	48 105 134	Forage Fodder	< 0.02 < 0.02 < 0.02	0.03 < 0.02 < 0.02	0.05	1991/11899
USA, Missouri 1989 (Asgrow 3127)	EC 720	1.68	Pre-plant	53 121 154	Forage Fodder	< 0.02 < 0.02 < 0.02	< 0.02 < 0.02 < 0.02	 0.14	1991/11899
USA, Missouri 1989 (Asgrow 3127)	EC 900	1.68	Pre-plant	53 121 154	Forage Fodder	< 0.02 < 0.02 < 0.02	< 0.02 < 0.02 < 0.02		1991/11899
USA, Arkansas, 1989 (Shiloh)	EC 900	1.68	Pre-plant	97 178	Forage Fodder	< 0.02 < 0.02	0.02 < 0.02	0.21[3]	1991/11899
USA, Louisiana, 1989 (Coker 485)	EC 720	1.68	Pre-plant	37 73 104	Forage Fodder	< 0.02 < 0.02 < 0.02	0.15 0.06 0.16	0.1 0.34[3] 0.39	1991/11899

'Forage' = the entire immature plant without roots
'Fodder' = the mature plants at harvest, after removal of beans by combine harvester
Pre-plant = soil applied and shallow rotary hoe incorporation to 5-8cm just before planting
[1]) Reanalysis of stored samples (for dimethenamid only) using method BS2304 (samples stored up to 32 months)
[2]) Reanalysis of stored forage, fodder samples for the sulfonate metabolite of dimethenamid (samples stored up to 27 months)
[3]) Interference in sulfonate analysis – single peak rather than double peaks (diastereomers)

Table 76. Residue data summary of supervised trials on soya bean forage and fodder in USA, involving a single pre-emergence treatment with dimethenamid.

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)			Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	Sulfonate	
USA, Arkansas, 1990 (Shiloh)	EC 900	1.68	Pre-em	49 96	Forage	< 0.01 < 0.01	< 0.02 0.03	- < 0.1	1991/11823 1992/12443[1] 1993/11797[2]
USA, Illinois, 1990 (NK 2920)	EC 900	1.68	Pre-em	36 102 137	Forage Fodder	< 0.01 < 0.01 < 0.01	0.09 < 0.02 < 0.02	< 0.2 < 0.1 < 0.1	1991/11823 1992/12443[1] 1993/11797[2]
USA, Minnesota, 1990 (Glenwood SB)	EC 900	1.68	Pre-em	54 103 126	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.02 < 0.02 < 0.02	< 0.2 - < 0.1	1991/11823 1992/12443[1] 1993/11797[2]
USA, Nth Carolina 1990 (Deltapine 416)	EC 900	1.68	Pre-em	40 103 158	Forage Fodder	< 0.01 < 0.01 < 0.01	0.57 0.06 < 0.02	0.25 0.27 < 0.1	1991/11823 1992/12443[1] 1993/11797[2]
USA, Ohio 1990 (Dekalb CX415)	EC 900	1.68	Pre-em	53 111 154	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.02 < 0.02 0.03	< 0.2 < 0.1 < 0.1	1991/11823 1992/12443[1] 1993/11797[2]

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)			Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	Sulfonate	
USA, Arkansas, 1989 (Shiloh)	EC 720	1.68	Pre-em	97 178	Forage Fodder	< 0.02 < 0.02	<< 0.02 < 0.02		1991/11899
USA, Arkansas, 1989 (Shiloh)	EC 900	1.68	Pre-em	97 178	Forage Fodder	< 0.02 < 0.02	< 0.02 < 0.02		1991/11899
USA, Georgia, 1989 (Wright)	EC 720	1.68	Pre-em	43 120 172	Forage Fodder	< 0.02 < 0.02 < 0.02	0.14 < 0.02 < 0.02	0.38 0.49	1991/11899
USA, Georgia, 1989 (Wright)	EC 900	1.68	Pre-em	43 120 172	Forage Fodder	< 0.02 < 0.02 < 0.02	< 0.02 < 0.02 < 0.02		1991/11899
USA, Iowa 1989 (Stine 2770)	EC 720	1.68	Pre-em	60 101 143	Forage Fodder	< 0.02 < 0.02 < 0.02	0.03 < 0.02 < 0.02	< 0.05 < 0.1	1991/11899
USA, Iowa 1989 (Stine 2770)	EC 900	1.68	Pre-em	60 101 143	Forage Fodder	< 0.02 < 0.02 < 0.02	0.03 < 0.02 < 0.02	< 0.05	1991/11899
USA, Louisiana, 1989 (Coker 485)	EC 720	1.68	Pre-em	37 73 104	Forage Fodder	< 0.02 < 0.02 < 0.02	0.14 < 0.02 0.03	0.28	1991/11899
USA, Minnesota 1989 (Glenwood SB)	EC 720	1.68	Pre-em	48 105 134	Forage Fodder	< 0.02 < 0.02 < 0.02	< 0.02 < 0.02 < 0.02	< 0.05 < 0.1	1991/11899
USA, Minnesota 1989 (Glenwood SB)	EC 900	1.68	Pre-em	48 105 134	Forage Fodder	< 0.02 < 0.02 < 0.02	< 0.02 < 0.02 < 0.02		1991/11899
USA, Missouri 1989 (Asgrow 3127)	EC 720	1.68	Pre-em	52 120 153	Forage Fodder	< 0.02 < 0.02 < 0.02	< 0.02 < 0.02 < 0.02		1991/11899
USA, Missouri 1989 (Asgrow 3127)	EC 900	1.68	Pre-em	52 120 153	Forage Fodder	< 0.02 < 0.02 < 0.02	< 0.02 < 0.02 < 0.02	 < 0.1	1991/11899
USA, Louisiana, 1989 (Coker 485)	EC 900	1.68	Pre-em	37 73 104	Forage Fodder	< 0.02 < 0.02 < 0.02	0.08 0.08 0.1	< 0.05 0.2[3] < 0.1	1991/11899

'Forage' means entire plant without roots

'Fodder' means the mature plants at harvest, after removal of seeds by combine harvester

Pre-em = pre-emergence broadcast spray

[1]) Reanalysis of stored samples (for dimethenamid only) using method BS2304 (samples stored up to 32 months)

[2]) Reanalysis of stored forage, fodder samples for the sulfonate metabolite of dimethenamid (samples stored up to 27 months)

[3]) Interference in sulfonate analysis – single peak rather than double peaks (diastereomers)

Table 77. Residue data summary of supervised trials on soya bean forage and fodder in USA, involving a single post-emergence treatment with dimethenamid.

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)			Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	Sulfonate	
USA, Arkansas, 1990 (Shiloh)	EC 900	1.68	Post-em 2-leaf	40 87	Forage	< 0.01 < 0.01	< 0.02 < 0.02	- < 0.1	1991/11823 1992/12443[1] 1993/11797[2]
USA, Illinois, 1990 (NK 2920)	EC 900	1.68	Post-em 2-leaf	22 88 123	Forage Fodder	< 0.01 < 0.01 < 0.01	0.03 < 0.02 0.05	< 0.2 < 0.1 < 0.1	1991/11823 1992/12443[1] 1993/11797[2]
USA, Nth Carolina 1990 (Deltapine 416)	EC 900	1.68	Post-em 2-leaf	34 97 152	Forage Fodder	< 0.01 < 0.01 < 0.01	0.04 0.04 0.05	< 0.2 0.14 < 0.1	1991/11823 1992/12443[1] 1993/11797[2]
USA, Ohio 1990 (Dekalb CX415)	EC 900	1.68	Post-em 2-leaf	35 111 154	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.02 < 0.02 < 0.02	< 0.2 < 0.1 < 0.1	1991/11823 1992/12443[1] 1993/11797[2]
USA, Minnesota, 1990 (Glenwood SB)	EC 900	1.68	Post-em 2-leaf	32 81 104	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.02 < 0.02 < 0.02	< 0.2 - < 0.1	1991/11823 1992/12443[1] 1993/11797[2]
USA, Georgia, 1989 (Wright)	EC 720	1.68	Post-em 2-leaf	35 112 164	Forage Fodder	< 0.02 < 0.02 < 0.02	0.08 < 0.02 < 0.02	0.18	1991/11899
USA, Georgia, 1989 (Wright)	EC 900	1.68	Post-em 2-leaf	35 112 164	Forage Fodder	< 0.02 < 0.02 < 0.02	0.26 < 0.02 0.03	0.31	1991/11899
USA, Iowa 1989 (Stine 2770)	EC 720	1.68	Post-em 2-leaf	49 90 132	Forage Fodder	< 0.02 < 0.02 < 0.02	0.05 < 0.02 < 0.02	< 0.05	1991/11899
USA, Iowa 1989 (Stine 2770)	EC 900	1.68	Post-em 2-leaf	49 90 132	Forage Fodder	< 0.02 < 0.02 < 0.02	0.04 < 0.02 < 0.02	< 0.05	1991/11899
USA, Louisiana, 1989 (Coker 485)	EC 720	1.68	Post-em 2-leaf	30 66 97	Forage Fodder	< 0.02 < 0.02 < 0.02	0.08 < 0.02 0.02	< 0.05	1991/11899
USA, Minnesota 1989 (Glenwood SB)	EC 720	1.68	Post-em 2-leaf	34 91 120	Forage Fodder	< 0.02 < 0.02 < 0.02	< 0.02 < 0.02 < 0.02		1991/11899
USA, Minnesota 1989 (Glenwood SB)	EC 900	1.68	Post-em 2-leaf	34 91 120	Forage Fodder	< 0.02 < 0.02 < 0.02	< 0.02 < 0.02 < 0.02		1991/11899
USA, Missouri 1989 (Asgrow 3127)	EC 720	1.68	Post-em 2-leaf	41 109 142	Forage Fodder	< 0.02 < 0.02 < 0.02	< 0.02 < 0.02 < 0.02		1991/11899

SOYA BEANS Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)			Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	Sulfonate	
USA, Missouri 1989 (Asgrow 3127)	EC 900	1.68	Post-em 2-leaf	41 109 142	Forage Fodder	< 0.02 < 0.02 < 0.02	< 0.02 < 0.02 < 0.02	0.05	1991/11899
USA, Arkansas, 1989 (Shiloh)	EC 720	1.68	Post-em 2-leaf	87 168	Forage Fodder	0.03, < 0.02 < 0.02	< 0.02 < 0.02		1991/11899
USA, Arkansas, 1989 (Shiloh)	EC 900	1.68	Post-em 2-leaf	87 168	Forage Fodder	< 0.02 < 0.02	0.02 < 0.02	0.18[3]	1991/11899
USA, Louisiana, 1989 (Coker 485)	EC 900	1.68	Post-em 2-leaf	30 66 97	Forage Fodder	< 0.02 < 0.02 < 0.02	0.08 < 0.02 < 0.02	0.42[3]	1991/11899

'Forage' means entire immature plant without roots
'Fodder' means the mature plants at harvest, after removal of seeds by combine harvester
Post-em = post emergence broadcast spray applied when plants were about the 2-leaf stage
[1]) Reanalysis of stored samples (for dimethenamid only) using method BS2304 (samples stored up to 32 months)
[2]) Reanalysis of stored forage, fodder samples for the sulfonate metabolite of dimethenamid (samples stored up to 27 months)
[3]) Interference in sulfonate analysis – single peak rather than double peaks (diastereomers)

Grasses (forage and fodder)

In trials on a selection of grass crops (grown for seed production) in USA in 1998, dimethenamid-P was applied to single-replicate plots as single post-emergence broadcast sprays (0.97-0.99 kg ai/ha) when the grass crops were 5-12 cm in height.

Whole plants (without roots) were sampled about 30 days and 60 days after treatment, together with additional samples that had been air-dried for 2-4 days after cutting. In one trial, intermediate samples were taken 14 days and 45 days after treatment. Both seeds and straw were sampled at harvest and analysed using Method AM-0884-0193-1, with an LOQ of 0.01 mg/kg and recovery rates of 94 ± 15% (n=9) in plants (forage), 110 ± 23% (n=9) in air-dried plants-hay, 101% (n=2) in straw and 104 ± 12% (n=3) in seeds at a fortification levels of 0.01-50 mg/kg.

GAPs for dimethenamid-P on grasses are:

Country	Application		Max use/season		PHI (days)	Comments
	Method	kg ai/ha	No	kg ai/ha		
USA	post-em	0.73 – 1.1	1	1.1	no grazing, not for animal feed	Seed crops

Table 78. Residue data summary of supervised trials on grasses (seed crops) in USA, involving a post-emergence treatment with dimethenamid-P.

GRASSES Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Moisture%	Reference & Comments
	Form	kg ai/ha	Method					

GRASSES Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Moisture%	Reference & Comments
	Form	kg ai/ha	Method					
USA, Washington, 1998 (Kentucky Bluegrass) Bluegrass	EC 720	0.98	Post-em	30 30+4[1] 60 60+3[1] 286	Forage Hay Forage Hay Straw Seeds	< 0.01 0.01 < 0.01 0.01 < 0.01 < 0.01	67% 23% 74% 21%	2001/5002336
USA, Oregon, 1998 (Wizard) Perennial ryegrass	EC 720	0.99	Post-em	29 29+4[1] 61 61+2[1] 288	Forage Hay Forage Hay Seeds	0.035 0.015 < 0.01 < 0.01 < 0.01	82% 81% 87%	2001/5002336
USA, Oregon, 1998 (Southern Choice) Tall fescue	EC 720	0.98	Post-em	29 29+4[1] 61 61+2[1] 288	Forage Hay Forage Hay Straw Seeds	< 0.01 0.01 < 0.01 < 0.01 < 0.01 < 0.01	76% 78% 86% 83% 24%	2001/5002336
USA, Oregon, 1999 (Cathedral 2) Perennial ryegrass	EC 720	0.97	Post-em	0 0+2[1] 14 14+2[1] 30 30+2[1] 45 45+2[1] 59 59+4[1] 240+6[1]	Forage Hay Forage Hay Straw Seeds	44.3 40 0.71 0.88 0.16 0.14 0.045 0.21 0.025 0.04 0.015 < 0.01	77% 53% 81% 74% 84% 78% 80% 65% 87% 66% 25%	2001/5002336
USA, Oregon, 1999 (Potomac) Orchard grass	EC 720	0.97	Post-em	44 30+2[1] 59 59+4[1] 217+3[1]	Forage Hay Forage Hay Straw Seeds	0.67 0.58 0.04 0.26 < 0.01 0.01	57% 78% 77% 66% 19%	2001/5002336
USA, Idaho, 1998 (Kentucky Bluegrass) Bluegrass	EC 720	0.99	Post-em	30 60 60+6[1] 314	Forage Forage Hay Straw Seeds	0.14 0.015 0.15 < 0.01 < 0.01	70% 26%	2001/5002336

'Forage' means entire plant without roots
'Hay' means the whole plant (without roots), cut and allowed to dry before collection
Straw and seed samples collected at normal seed harvest time
[1]) Drying interval after cutting

Maize forage and fodder

Details of the residue trial designs and analytical methodologies used in the supervised residue trials summarized below are included in the previous section relating to maize.

GAPs for dimethenamid-P on maize are:

Country	Application		Max use/season		PHI (days)	Comments
	Method	kg ai/ha	No	kg ai/ha		
Belgium	pre-em	1.0	1			
Belgium	post-em	1.0	1			at 3-4 leaf stage
France	pre-em	0.72 – 1.0	1		90	
Germany	pre-em	1.0				
Germany	post-em	1.0	1			up to 6-leaf stage
Greece	pre-plant	0.9-1.0				registration pending
Greece	pre-em	0.9-1.0				registration pending
Netherlands	pre-em	1.0	1			
Netherlands	post-em	1.0	1			at 2-6 leaf stage
Spain	pre-em	0.72 – 1.0				
Spain	post-em	0.72 – 1.0				
USA	pre-plant	0.63 – 1.1	1-2[1]	1.1	40 (forage)	
USA	pre-em	0.63 – 1.1	1-2[1]	1.1	40 (forage)	
USA	post-em	0.63 – 1.1	1-2[1]		40 (forage)	directed spray at lay by (30-90 cm height)
USA	post-em	0.63 – 1.1	1-2[1]		40 (forage)	up to 30 cm height

[1]) Split applications also recommended, generally involving pre-plant or pre-emergence treatment at 50-66% recommended rate and a pre-emergence or post-emergence treatment at 33-50% recommended rate, not closer than 14 days later

Table 79. Residue data summary of supervised trials on maize forage and fodder in Canada, involving a single pre-plant treatment with dimethenamid.

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Canada, Ontario, 1992 (Pioneer 3962)	EC 900	0.75	Pre-plant	30 60 112 180	Forage Fodder	< 0.01 (4) < 0.01 (4) < 0.01 (4) < 0.01 (4)	1993/5000184
Canada, Georgetown, 1991 (Pioneer 3897)	EC 900	1.25	Pre-plant	60 90 120 150	Forage Fodder	≤ 0.01 (4) < 0.01 (4) < 0.01 (4) ≤ 0.01 (4)	1993/5000761
Canada, Georgetown, 1991 (Pioneer 3897)	EC 900	1.25	Pre-plant	60 90 120 150	Forage Fodder	≤ 0.01 (4) < 0.01 (4) < 0.01 (4) ≤ 0.01 (4)	1993/5000761
Canada, Ontario, 1992 (Pioneer 3962)	EC 900	1.5	Pre-plant	30 60 112 180	Forage Fodder	≤ 0.01 (4) < 0.01 (4) < 0.01 (4) ≤ 0.01 (4)	1993/5000184

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Canada, Georgetown, 1991 (Pioneer 3897)	EC 900	2.5	Pre-plant	60 90 120 150	Forage Fodder	≤ 0.01 (4) < 0.01 (4) < 0.01 (4) ≤ 0.01 (4)	1993/5000761
Canada, Georgetown, 1991 (Pioneer 3897)	EC 900	2.5	Pre-plant	60 90 120 150	Forage Fodder	≤ 0.01 (4) < 0.01 (4) < 0.01 (4) ≤ 0.01 (4)	1993/5000761
Canada, Ontario, 1992 (Pioneer 3962)	EC 900	3.0	Pre-plant	30 60 112 180	Forage Fodder	≤ 0.01 (4) < 0.01 (4) < 0.01 (4) ≤ 0.01 (4)	1993/5000184

'Forage' means entire plant without roots
'Fodder' means mature stalks and leaves, without cobs sampled at normal harvest
Pre-plant = soil applied and shallow rotary hoe incorporation to 5-8cm just before planting

Table 80. Residue data summary of supervised trials on maize forage and fodder in USA, involving a single pre-plant treatment with dimethenamid.

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Sulfonate	
USA, Colorado, 1991 (Funks 4311)	EC 900	1.68	Pre-plant	60 143 160	Forage Fodder	≤ 0.01 < 0.01 ≤ 0.01	< 0.2 < 0.1 < 0.1	1992/12434 1992/12427
USA, Illinois 1990 (NK 7686)	EC 900	1.68	Pre-plant	60 138 151	Forage Fodder	≤ 0.01 < 0.01 ≤ 0.01	< 0.2 < 0.1 < 0.1	1992/12436 1992/12427
USA, Indiana, 1991 (Pioneer 3343)	EC 900	1.68	Pre-plant	59 128 149	Forage Fodder	≤ 0.01 < 0.01 ≤ 0.01	< 0.2 < 0.1 < 0.1	1992/12434 1992/12427
USA, Iowa, 1990 (Pioneer 3379)	EC 720	1.68	Pre-plant	66 111 155	Forage Fodder	≤ 0.01 < 0.01 ≤ 0.01	< 0.2 < 0.1 < 0.1	1992/12436 1992/12427
USA, Nebraska, 1990 (NC5891)	EC 900	1.68	Pre-plant	68 133 162	Forage Fodder	≤ 0.01 < 0.01 ≤ 0.01	< 0.2 < 0.1 < 0.1	1992/12436 1992/12427
USA, New York, 1990 (Pioneer 3790)	EC 900	1.68	Pre-plant	70 134 168	Forage Fodder	≤ 0.01 < 0.01 ≤ 0.01	< 0.2 < 0.1 < 0.1	1992/12436 1992/12427
USA, North Carolina, 1991 (Pioneer 3055)	EC 900	1.68	Pre-plant	60 104 124	Forage Fodder	≤ 0.01 < 0.01 ≤ 0.01	< 0.2 < 0.1 < 0.1	1992/12434 1992/12427

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Sulfonate	
USA, Ohio 1991 (Pioneer 3352)	EC 900	1.68	Pre-plant	56 125 139	Forage Fodder	≤ 0.01 < 0.01 ≤ 0.01	< 0.2 < 0.1 < 0.1	1992/12434 1992/12427
USA, Ohio, 1990 (Dekalb 636)	EC 900	1.68	Pre-plant	60 124 158	Forage Fodder	≤ 0.01 < 0.01 ≤ 0.01	< 0.2 < 0.1 < 0.1	1992/12436 1992/12427
USA, Illinois, 1991 (NK 77-51)	EC 900	1.68	Pre-plant	63 105 127	Forage Fodder	≤ 0.01 < 0.01 ≤ 0.01	< 0.2 < 0.1 < 0.1	1992/12434 1992/12427
USA, Iowa, 1991 (Pioneer 3379)	EC 900	1.68	Pre-plant	60 107 142	Forage Fodder	≤ 0.01 < 0.01 ≤ 0.01	< 0.2 < 0.1 < 0.1	1992/12434 1992/12427

'Forage' means entire plant without roots
'Fodder' means mature stalks and leaves, without cobs sampled at normal harvest
Pre-plant = soil applied and shallow rotary hoe incorporation to 5-8 cm just before planting

Table 81. Residue data summary of supervised trials on maize forage and fodder in Canada, involving a single pre-emergence treatment with dimethenamid.

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Canada, Ontario, 1992 (Pioneer 3962)	EC 900	0.75	Pre-em	30 60 112 180	Forage Fodder	< 0.01 (4) < 0.01 (4) < 0.01 (4) < 0.01 (4)	1993/5000184
Canada, Culloden Easey, 1991 (Pride K228)	EC 900	1.25	Pre-em	60 90 120 150	Forage Fodder	≤ 0.01 (4) < 0.01 (4) < 0.01 (4) ≤ 0.01 (4)	1993/5000761
Canada, London, 1991 (Pioneer)	EC 900	1.25	Pre-em	60 90 120 150	Forage Fodder	≤ 0.01 (4) < 0.01 (4) < 0.01 (4) ≤ 0.01 (4)	1993/5000761
Canada, Ontario, 1992 (Pioneer 3962)	EC 900	1.5	Pre-em	30 60 112 180	Forage Fodder	< 0.01 (4) ≤ 0.01 (4) < 0.01 (4) ≤ 0.01 (4)	1993/5000184
Canada, Culloden Easey, 1991 (Pride K228)	EC 900	2.5	Pre-em	60 90 120 150	Forage Fodder	≤ 0.01 (4) < 0.01 (4) < 0.01 (4) ≤ 0.01 (4)	1993/5000761
Canada, London, 1991 (Pioneer)	EC 900	2.5	Pre-em	60 90 120 150	Forage Fodder	≤ 0.01 (4) < 0.01 (4) < 0.01 (4) ≤ 0.01 (4)	1993/5000761

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Canada, Ontario, 1992 (Pioneer 3962)	EC 900	3.0	Pre-em	30 60 112 180	Forage Fodder	0.01 (2) < 0.01 (2) ≤ 0.01 (4) < 0.01 (4) ≤ 0.01 (4)	1993/5000184

'Pre-em' means pre-emergence broadcast spray
'Forage' means entire plant without roots
'Fodder' means mature stalks and leaves, without cobs, sampled at normal harvest
'Cobs' means kernels plus cobs, without the husks

Table 82. Residue data summary of supervised trials on maize forage and fodder in USA, involving a single pre-emergence treatment with dimethenamid.

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Sulfonate	
USA, Colorado, 1991 (Funks 4311)	EC 900	1.68	Pre-em	60 143 160	Forage Fodder	≤ 0.01 < 0.01 ≤ 0.01	< 0.2 < 0.1 < 0.1	1992/12434 1992/12427
USA, Illinois 1990 (NK 7686)	EC 900	1.68	Pre-em	60 138 151	Forage Fodder	≤ 0.01 < 0.01 ≤ 0.01	< 0.2 < 0.1 < 0.1	1992/12436 1992/12427
USA, Indiana, 1991 (Pioneer 3343)	EC 900	1.68	Pre-em	59 128 149	Forage Fodder	≤ 0.01 < 0.01 ≤ 0.01	< 0.2 < 0.1 < 0.1	1992/12434 1992/12427
USA, Iowa, 1990 (Pioneer 3379)	EC 720	1.68	Pre-em	66 111 155	Forage Fodder	≤ 0.01 < 0.01 ≤ 0.01	< 0.2 < 0.1 < 0.1	1992/12436 1992/12427
USA, Nebraska, 1990 (NC5891)	EC 900	1.68	Pre-em	67 132 161	Forage Fodder	≤ 0.01 < 0.01 ≤ 0.01	< 0.2 < 0.1 < 0.1	1992/12436 1992/12427
USA, New York, 1990 (Pioneer 3790)	EC 900	1.68	Pre-em	69 133 167	Forage Fodder	≤ 0.01 < 0.01 ≤ 0.01	< 0.2 < 0.1 < 0.1	1992/12436 1992/12427
USA, North Carolina, 1991 (Pioneer 3055)	EC 900	1.68	Pre-em	60 104 124	Forage Fodder	≤ 0.01 < 0.01 ≤ 0.01	< 0.2 < 0.1 < 0.1	1992/12434 1992/12427
USA, Ohio 1991 (Pioneer 3352)	EC 900	1.68	Pre-em	56 125 139	Forage Fodder	≤ 0.01 < 0.01 ≤ 0.01	< 0.2 < 0.1 < 0.1	1992/12434 1992/12427
USA, Ohio, 1990 (Dekalb 636)	EC 900	1.68	Pre-em	60 124 158	Forage Fodder	0.016 [1] < 0.01 ≤ 0.01	< 0.2 < 0.1 < 0.1	1992/12436 1992/12427
USA, Illinois, 1991 (NK 77-51)	EC 900	1.68	Pre-em	63 105 127	Forage Fodder	≤ 0.01 < 0.01 ≤ 0.01	< 0.2 < 0.1 < 0.1	1992/12434 1992/12427

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Sulfonate	
USA, Iowa, 1991 (Pioneer 3379)	EC 900	1.68	Pre-em	60 107 142	Forage Fodder	≤ 0.01 < 0.01 ≤ 0.01	< 0.2 < 0.1 < 0.1	1992/12434 1992/12427

'Pre-em' means pre-emergence broadcast spray
'Forage' means entire plant without roots
'Fodder' means mature stalks and leaves, without cobs, sampled at normal harvest
[1]) Residue not confirmed. Repeat analysis with GC-MSD reported < 0.01 mg/kg

Table 83. Residue data summary of supervised trials on maize forage and fodder in France, Germany, Italy, Spain and Switzerland, involving a single pre-emergence treatment with dimethenamid

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
France, Soulaines sur Aubance, 1990 (DK250)	EC 900	1.44	Pre-em	59 94 129	Forage	≤ 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	1991/11888
France, Esbarres, 1990 (DEA)	EC 900	1.44	Pre-em	34 64 92 120 148	Forage Fodder	< 0.01, < 0.01 ≤ 0.01, < 0.01 ≤ 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	1991/11889
Italy, Cervia, 1990 (Paolo)	EC 900	1.44	Pre-em	30 61 91 122	Forage	0.01, < 0.01 ≤ 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	1991/11890
Italy, Ariano Polesine, 1990 (not specified)	EC 900	1.44	Pre-em	31 61 92 123	Forage	< 0.01 < 0.01 ≤ 0.01 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01	1991/11891
Italy, Castiglione di Cervia, 1990 (Luana)	EC 900	1.48	Pre-em	91	Forage	≤ 0.01, < 0.01	1991/11892
Italy, Ariano Polesine, 1990 (Prisma)	EC 900	1.42	Pre-em	92	Forage	≤ 0.01, < 0.01	1991/11893
France, Magny Les Aubigny, 1990 (DEA)	EC 900	1.49	Pre-em	142	Fodder	≤ 0.01	1991/11894
France, Maison Dieu, 1990 (DK250	EC 900	1.4	Pre-em	148	Fodder	≤ 0.01, < 0.01	1991/11895
France, Brazey-en-Plaine, 1990 (DEA)	EC 900	1.42	Pre-em	33 66 91 119 152	Forage Fodder	< 0.01, < 0.01 ≤ 0.01, < 0.01 ≤ 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	1991/11896
France, Courchamps, 1990 (Anjou 29)	EC 900	1.4	Pre-em	158	Fodder	≤ 0.01, < 0.01	1991/11897
Spain, La Algaba, 1992 (not specified)	EC 900	1.44	Pre-em	60	Forage	≤ 0.01	1993/11660
Spain, La Isla, 1992 (not specified)	EC 900	1.44	Pre-em	60	Forage	≤ 0.01	1993/11660

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Spain, Palma del Rio, 1992 (not specified)	EC 900	1.44	Pre-em	60	Forage	< 0.01	1993/11660
Spain, Rinconada, 1992 (not specified)	EC 900	1.44	Pre-em	59	Forage	< 0.01	1993/11660
Switzerland, Mariastein, 1991 (Corso)	EC 900	1.44	Pre-em	60 91 120 150 168	Forage Fodder Stalk	< 0.01 < 0.01 < 0.01 < 0.01 < 0.01	1994/10861
Switzerland, Sisseln, 1991 (Dea)	EC 900	1.44	Pre-em	60 90 120 150 161	Forage Fodder Stalk	< 0.01 < 0.01 < 0.01 < 0.01 < 0.01	1994/10861
Germany, Bayern, 1991 (Buras)	EC 900	1.44	Pre-em	31 60 88 119 150 169	Forage Fodder 	< 0.01 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01	1995/11381

'Forage' means entire plant without roots
'Fodder' means the rest of the plant, without roots, after cobs have been removed for analysis

Table 84. Residue data summary of supervised trials on maize forage and fodder in USA, involving a single post-emergence treatment with dimethenamid.

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Sulfonate	
USA, Colorado, 1991 (Funks 4311)	EC 900	1.68	Post-em (4-5 leaf)	28 111 128	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.2 < 0.1 < 0.1	1992/12434 1992/12427[2]
USA, Illinois 1990 (NK 7686)	EC 900	1.68	Post-em (2-3 leaf)	36 114 127	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.2 < 0.1 < 0.1	1992/12436 1992/12427[3]
USA, Indiana, 1991 (Pioneer 3343)	EC 900	1.68	Post-em (4-9 leaf)	32 101 122	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.2 < 0.1 < 0.1	1992/12434 1992/12427[2]
USA, Iowa, 1990 (Pioneer 3379)	EC 720	1.68	Post-em (5-6 leaf)	28 74 118	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.2 < 0.1 < 0.1	1992/12436 1992/12427[3]
USA, Nebraska, 1990 (NC5891)	EC 900	1.68	Post-em (5-6 leaf)	28 93 122	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.2 < 0.1 < 0.1	1992/12436 1992/12427[3]

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Sulfonate	
USA, New York, 1990 (Pioneer 3790)	EC 900	1.68	Post-em (4-9 leaf)	34 98 132	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.2 < 0.1 < 0.1	1992/12436 1992/12427[3]
USA, North Carolina, 1991 (Pioneer 3055)	EC 900	1.68	Post-em (5- leaf)	39 83 103	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.2 < 0.1 < 0.1	1992/12434 1992/12427[2]
USA, Ohio 1991 (Pioneer 3352)	EC 900	1.68	Post-em (2-3 leaf)	41 110 124	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.2 < 0.1 < 0.1	1992/12434 1992/12427[2]
USA, Ohio, 1990 (Dekalb 636)	EC 900	1.68	Post-em (5-leaf)	28 92 126	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.2 < 0.1 < 0.1	1992/12436 1992/12427[3]
USA, Illinois, 1991 (NK 77-51)	EC 900	1.68	Post-em (5-6 leaf)	46 88 110	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.2 < 0.1 < 0.1	1992/12434 1992/12427[2]
USA, Iowa, 1991 (Pioneer 3379)	EC 900	1.68	Post-em (5-6 leaf)	37 84 119	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.2 < 0.1 < 0.1	1992/12434 1992/12427[2]

‘Post-em’ means post-emergence broadcast spray
‘Forage’ means entire plant without roots
‘Fodder’ means mature stalks and leaves, without cobs, sampled at normal harvest

Table 85. Residue data summary of supervised trials on maize forage and fodder in Canada, involving a single post-emergence treatment with dimethenamid.

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Canada, Ontario, 1992 (Pioneer 3962)	EC 900	0.75	Post-em (12d after planting)	30 60 112 180	Forage Fodder	< 0.01 (4) < 0.01 (4) < 0.01 (4) < 0.01 (4)	1993/5000184
Canada, Ontario, 1992 (Pioneer 3962)	EC 900	1.5	Post-em (12d after planting)	30 60 112 180	Forage Fodder	< 0.01 (4) < 0.01 (4) < 0.01 (4) < 0.01 (4)	1993/5000184
Canada, Ontario, 1992 (Pioneer 3962)	EC 900	3.0	Post-em (12d after planting)	30 60 112 180	Forage Fodder	0.01 (2) < 0.01 (2) < 0.01 (4) < 0.01 (4) < 0.01 (4)	1993/5000184

‘Post-em’ means post-emergence broadcast spray
‘Forage’ means entire plant without roots
‘Fodder’ means mature stalks and leaves, without cobs, sampled at normal harvest

Table 86. Residue data summary of supervised trials on maize forage and fodder in Belgium, France, Germany, Italy and Netherlands, involving a single post-emergence treatment with dimethenamid

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Germany, Baden, 1993 (Aladin)	EC 900	1.37	Post-em (2-3 leaf)	0 14 30 60 90 123 151	Forage Fodder	46 0.02 0.02 < 0.01 < 0.01 < 0.01 < 0.01	1994/10643
Germany, Bayern, 1993 (Jericho)	EC 900	1.41	Post-em (3-leaf)	0 14 30 61 90 120 149	Forage Fodder	78.2 0.01 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01	1994/10643
Germany, Nordrhein, 1993 (Apache)	EC 900	1.39	Post-em (3-leaf)	0 15 30 59 89 121 147	Forage Fodder	98.7 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01	1994/10643
Germany, Hessen, 1993 (Tau)	EC 900	1.44	Post-em (3-leaf)	0 14 29 60 90 120 150	Forage Fodder	48.6 0.23 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01	1994/10643
Germany, Hessen, 1991 (DEA)	EC 900	1.44	Post-em (7-9 leaf)	34 60 90 120	Forage Fodder	< 0.01 < 0.01 < 0.01 < 0.01	1995/11381
Germany, Niedersachsen, 1991 (Anjou)	EC 900	1.44	Post-em (8-leaf)	46 60 90 120 152 165	Forage Fodder	< 0.01 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01	1995/11381
Belgium, Brabant, 1998 (Irene)	EC 900	1.43	Post-em (5-leaf)	0 21 118	Forage Fodder	5.2 0.02 0.01	1999/10005 Bridging trial
Germany, Rheinland-Plafz, 1998 (Magelan)	EC 900	1.43	Post-em (6-leaf)	0 27 78 78 111	Forage Cobs&husks Fodder	1.7 < 0.01 < 0.01 < 0.01 < 0.01	1999/10005 Bridging trial

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Italy, Ferrara, 1998 (Fenice)	EC 900	1.37	Post-em (4-5 leaf)	0 47 93 93 118	Forage Cobs&husks Fodder	5.84 < 0.01 < 0.01 < 0.01 < 0.01	1999/10007 Bridging trial
Italy, Cremona, 1998 (D17112A)	EC 900	1.37	Post-em (5-6 leaf)	0 43 98 98 122	Forage Cobs&husks Fodder	12.7 < 0.01 < 0.01 < 0.01 < 0.01	1999/10007 Bridging trial
Netherlands, Limburg, 1998 (LG 2244)	EC 900	1.45	Post-em (5-leaf)	0 26 114 114	Forage Cobs&husks Fodder	33.7 0.01 < 0.01 < 0.01	1999/10005 Bridging trial
France, St Pardon de Conques, 1998 (DK512)	EC 900	1.33	Post-em (5-leaf)	0 36 99 99 146	Forage Cobs&husks Fodder	18.5 0.03 < 0.01 < 0.01 < 0.01	1999/10007 Bridging trial

'Post-em' means post emergence broadcast spray
'Forage' means entire plant without roots
'Fodder' means the rest of the plant, without roots, after cobs have been removed for analysis
'Cobs & husks' means kernels with both cobs and the husks

Table 87. Residue data summary of supervised trials on maize forage and fodder in Belgium, France, Germany, Italy and Netherlands, involving early a single post-emergence treatment with dimethenamid-P.

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Belgium, Brabant, 1998 (Irene)	EC 720	0.99	Post-em (5-leaf)	0 21 118 118	Forage Cobs&husks Fodder	3.58 ≤ 0.01 < 0.01 ≤ 0.01	1999/10005 Bridging trial
Germany, Rheinland-Plafz, 1998 (Magelan)	EC 720	1.0	Post-em (6-leaf)	0 27 78 78 111	Forage Cobs&husks Fodder	1.0 ≤ 0.01 < 0.01 < 0.01 < 0.01	1999/10005 Bridging trial

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
Italy, Ferrara, 1998 (Fenice)	EC 720	0.97	Post-em (4-5 leaf)	0 47 93 93 118	Forage Cobs&husks Fodder	1.03 0.03 < 0.01 ≤ 0.01 < 0.01	1999/10007 Bridging trial
Italy, Cremona, 1998 (D17112A)	EC 720	0.97	Post-em (5-6 leaf)	0 43 98 98 122	Forage Cobs&husks Fodder	3.9 0.02 < 0.01 ≤ 0.01 < 0.01	1999/10007 Bridging trial
Netherlands, Limburg, 1998 (LG 2244)	EC 720	1.09	Post-em (5-leaf)	0 26 114 114	Forage Cobs&husks Fodder	20.2 ≤ 0.01 < 0.01 ≤ 0.01	1999/10005 Bridging trial
France, St Pardon de Conques, 1998 (DK512	EC 720	1.0	Post-em (5-leaf)	0 36 99 99 146	Forage Cobs&husks Fodder	15.4 0.04 < 0.01 ≤ 0.01 < 0.01	1999/10007 Bridging trial

'Post-em' means post emergence broadcast spray
'Forage' means entire plant without roots
'Fodder' means the rest of the plant, without roots, after cobs have been removed for analysis
'Cobs&husks' means kernels with both cobs and the husks

Maize fodder and forage samples from studies in USA, during 1988 and 1989, were analysed for dimethenamid and the oxalamide metabolite using method AM-0840-0790-0 and in some trials, samples were re-analysed for dimethenamid only (Method BS2304). The results of these analyses are summarised below.

Table 88. Residue data summary of supervised trials on maize forage and fodder in USA, involving a single pre-plant treatment with dimethenamid.

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	
USA, N Carolina, 1988 (Pioneer 3320)	EC 720	1.37	Pre-plant	62 100 156	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Colorado, 1988 (Garst 8388MF)	EC 720	1.4	Pre-plant	68 123 179	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Iowa, 1988 (Pioneer 3732)	EC 720	1.57	Pre-plant	56 104 138	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	
USA, Sth Dakota, 1988 (Maize 2330)	EC 720	1.57	Pre-plant	53 94 119	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Illinois, 1988 (FS2368)	EC 720	1.68	Pre-plant	62 112 133	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Illinois, 1988 (Pioneer 3377)	EC 720	1.68	Pre-plant	62 112 133	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Illinois, 1989 (Northrup King 7686)	EC 720	1.68	Pre-plant	87 162 188	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Illinois, 1989 (Northrup King 7686)[1]	EC 900	1.68	Pre-plant	87 162 188	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Indiana, 1988 (Pioneer 3377)	EC 720	1.68	Pre-plant	128 178	Forage Fodder	< 0.01 < 0.01	< 0.01 < 0.01	1990/11093
USA, Indiana, 1988 (Pioneer 3377)	EC 720	1.68	Pre-plant	128 178	Forage Fodder	< 0.01 < 0.01	< 0.01 < 0.01	1990/11093
USA, Iowa, 1988 (Dockendorf 7670)	EC 720	1.68	Pre-plant	60 117 152	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Iowa, 1989 (Pioneer 3379)	EC 720	1.68	Pre-plant	62 119 162	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Iowa, 1989 (Pioneer 3379)	EC 900	1.68	Pre-plant	62 119 162	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Minnesota, 1988 (Pioneer 3737)	EC 720	1.68	Pre-plant	53 122 140	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Minnesota, 1988 (Pioneer 3737)	EC 720	1.68	Pre-plant	53 122 140	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Nebraska, 1988 (Funks G4440)	EC 720	1.68	Pre-plant	49 107 128	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Nebraska, 1989 (NC5891)	EC 720	1.68	Pre-plant	67	Forage	< 0.01	< 0.01	1990/11108 1992/12435[1]
USA, Nebraska, 1989 (NC5891)	EC 900	1.68	Pre-plant	67	Forage	< 0.01	< 0.01	1990/11108 1992/12435[1]

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	
USA, New York, 1989 (Pioneer 3925)	EC 720	1.68	Pre-plant	60 140 177	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, New York, 1989 (Pioneer 3925)	EC 900	1.68	Pre-plant	60 140 177	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Ohio, 1988 Madison GL27)	EC 720	1.68	Pre-plant	63 117 161	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Oregon, 1989 (Northrup King PX39)	EC 720	1.68	Pre-plant	74 137 179	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Oregon, 1989 (Northrup King PX39)	EC 900	1.68	Pre-plant	74 137 179	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Texas, 1989 (George Warner)	EC 900	1.68	Pre-plant	56 84 127	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Wisconsin, 1988 (Pioneer 3737)	EC 720	1.68	Pre-plant	60 133 185	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Texas, 1989 (George Warner)	EC 720	1.68	Pre-plant	56 84 127	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]

'Forage' means entire immature plant without roots
'Fodder' means mature stalks and leaves, without cobs, sampled at normal harvest
Pre-plant = soil applied and shallow rotary hoe incorporation to 5-8cm just before planting
[1]) Reported dimethenamid residues are based on reanalysis of stored samples using method BS2304

Table 89. Residue data summary of supervised trials on maize forage and fodder in USA, involving a single pre-emergence treatment with dimethenamid.

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	
USA, Colorado, 1988 (Garst 8388MF)	EC 720	1.4	Pre-em	68 123 179	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Illinois, 1988 (FS2368)	EC 720	1.68	Pre-em	60 110 131	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Illinois, 1988 (Pioneer 3377)	EC 720	1.68	Pre-em	60 110 131	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	
USA, Illinois, 1989 (Northrup King 7686)	EC 720	1.68	Pre-em	87 162 188	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Illinois, 1989 (Northrup King 7686)	EC 900	1.68	Pre-em	87 162 188	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Indiana, 1988 (Pioneer 3377)	EC 720	1.68	Pre-em	128 178	Forage Fodder	< 0.01 < 0.01	< 0.01 < 0.01	1990/11093
USA, Indiana, 1988 (Pioneer 3377)	EC 720	1.68	Pre-em	128 178	Forage Fodder	< 0.01 < 0.01	< 0.01 < 0.01	1990/11093
USA, Iowa, 1988 (Dockendorf 7670)	EC 720	1.68	Pre-em	60 117 152	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Iowa, 1988 (Pioneer 3732)	EC 720	1.57	Pre-em	56 104 138	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Iowa, 1989 (Pioneer 3379)	EC 720	1.68	Pre-em	62 119 162	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Iowa, 1989 (Pioneer 3379)	EC 900	1.68	Pre-em	62 119 162	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Minnesota, 1988 (Pioneer 3377)	EC 720	1.68	Pre-em	53 122 140	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Minnesota, 1988 (Pioneer 3737)	EC 720	1.68	Pre-em	53 122 140	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, N Carolina, 1988 (Pioneer 3320)	EC 720	1.42	Pre-em	61 99 155	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Nebraska, 1988 (Funks G4440)	EC 720	1.68	Pre-em	49 107 128	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Nebraska, 1989 (NC5891)	EC 720	1.68	Pre-em	66 164 	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Nebraska, 1989 (NC5891)	EC 900	1.68	Pre-em	66 164 	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	
USA, New York, 1989 (Pioneer 3925)	EC 720	1.68	Pre-em	55 135 172	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, New York, 1989 (Pioneer 3925)	EC 900	1.68	Pre-em	55 135 172	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Ohio, 1988 Madison GL27)	EC 720	1.68	Pre-em	63 117 161	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Oregon, 1989 (Northrup King PX39)	EC 720	1.68	Pre-em	74 137 179	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Oregon, 1989 (Northrup King PX39)	EC 900	1.68	Pre-em	74 137 179	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Sth Dakota, 1988 (Maize 2330)	EC 720	1.68	Pre-em	49 90 115	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Texas, 1989 (George Warner)	EC 900	1.68	Pre-em	56 84 127	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Wisconsin, 1988 (Pioneer 3737)	EC 720	1.68	Pre-em	60 133 186	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Texas, 1989 (George Warner)	EC 720	1.68	Pre-em	56 84 127	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]

'Pre-em' means pre-emergence broadcast spray
'Forage' means entire plant without roots
'Fodder' means the mature stems and leaves after cobs have been removed for analysis
[1]) Reported dimethenamid residues are based on reanalysis of stored samples using method BS2304

Table 90. Residue data summary of supervised trials on maize forage and fodder in USA, involving a single post-emergence treatment with dimethenamid.

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	
USA, Illinois, 1988 (FS2368)	EC 720	1.68	Post-em (5-8cm)	49 99 120	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Illinois, 1988 (Pioneer 3377)	EC 720	1.68	Post-em (5-8cm)	49 99 120	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	
USA, Illinois, 1989 (Northrup King 7686)	EC 720	1.68	Post-em (5- leaf)	60 135 161	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Illinois, 1989 (Northrup King 7686)	EC 900	1.68	Post-em (5- leaf)	60 135 161	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Indiana, 1988 (Pioneer 3377)	EC 720	1.68	Post-em (5- leaf)	94 144	Forage Fodder	< 0.01 < 0.01	< 0.01 < 0.01	1990/11093
USA, Indiana, 1988 (Pioneer 3377)	EC 720	1.68	Post-em (5- leaf)	94 144	Forage Fodder	< 0.01 < 0.01	< 0.01 < 0.01	1990/11093
USA, Iowa, 1988 (Dockendorf 7670)	EC 720	1.68	Post-em (5- leaf)	39 96 131	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Iowa, 1989 (Pioneer 3379)	EC 720	1.68	Post-em (2-3 leaf)	47 104 147	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Iowa, 1989 (Pioneer 3379)	EC 900	1.68	Post-em (2-3 leaf)	47 104 147	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Minnesota, 1988 (Pioneer 3377)	EC 720	1.68	Post-em (5- leaf)	35 104 122	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Minnesota, 1988 (Pioneer 3737)	EC 720	1.68	Post-em (5- leaf)	35 104 122	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Nebraska, 1988 (Funks G4440)	EC 720	1.68	Post-em (30-36cm)	18 76 97	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Nebraska, 1989 (NC5891)	EC 720	1.68	Post-em (5-6 leaf)	35 133	Forage Fodder	< 0.01 < 0.01	< 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Nebraska, 1989 (NC5891)	EC 900	1.68	Post-em (5-6 leaf)	35 133	Forage Fodder	< 0.01 < 0.01	< 0.01 < 0.01	1990/11108 1992/12435[1]
USA, New York, 1989 (Pioneer 3925)	EC 720	1.68	Post-em (5-6 leaf)	18 98 135	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, New York, 1989 (Pioneer 3925)	EC 900	1.68	Post-em (5-6 leaf)	18 98 135	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Ohio, 1988 Madison GL27)	EC 720	1.68	Post-em (5-6 leaf)	29 83 127	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093

MAIZE Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method			Parent	Oxalamide	
USA, Oregon, 1989 (Northrup King PX39)	EC 720	1.68	Post-em (4-9 leaf)	45 108 150	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Oregon, 1989 (Northrup King PX39)	EC 900	1.68	Post-em (4-9 leaf)	45 108 150	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Sth Dakota, 1988 (Maize 2330)	EC 720	1.68	Post-em (5-6 leaf)	29 70 95	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Texas, 1989 (George Warner)	EC 900	1.68	Post-em (5-6 leaf)	34 62 105	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Wisconsin, 1988 (Pioneer 3737)	EC 720	1.68	Post-em (6-leaf)	26 99 152	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Texas, 1989 (George Warner)	EC 720	1.68	Post-em (5-6 leaf)	34 62 105	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11108 1992/12435[1]
USA, Colorado, 1988 (Garst 8388MF)	EC 720	1.4	Post-em (5- leaf)	37 92 148	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, N Carolina, 1988 (Pioneer 3320)	EC 720	1.38	Post-em (30-45cm)	41 79 135	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093
USA, Iowa, 1988 (Pioneer 3732)	EC 720	1.57	Post-em (4-9 leaf)	13 61 95	Forage Fodder	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	1990/11093

'Pre-em' means pre-emergence broadcast spray
'Forage' means entire plant without roots
'Fodder' means mature stalks and leaves, without cobs, sampled at normal harvest

Sorghum forage and fodder

Details of the residue trial designs and analytical methodologies used in the supervised residue trials summarized below are included in the previous section relating to sorghum.

GAPs for dimethenamid-P on sorghum are:

Country	Application		Max use/season		PHI (days)	Comments
	Method	kg ai/ha	No	kg ai/ha		
France	post-em	0.86	1		90	
USA	pre-plant	0.63 – 1.1	1-2[1]	1.1	60 (forage) 80 (grain, fodder)	
USA	pre-em	0.63 – 1.1	1-2[1]	1.1	60 (forage) 80 (grain, fodder)	
USA	post-em	0.63 – 1.1	1-2[1]	1.1	60 (forage)	up to 30cm height

Country	Application		Max use/season		PHI (days)	Comments
	Method	kg ai/ha	No	kg ai/ha		
					80 (grain, fodder)	

[1]) Split applications also recommended, generally involving pre-plant or pre-emergence treatment at 50-66% recommended rate and a pre-emergence or post-emergence treatment at 33-50% recommended rate, not closer than 14 days later

Table 91. Residue data summary of supervised trials on sorghum forage and fodder in USA, involving a single pre-emergence treatment with dimethenamid.

SORGHUM Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Colorado, 1994 (Cargill 577)	EC 900	1.68	Pre-em	104 136	Forage Fodder	< 0.01 < 0.01	1995/10781
USA, Kansas, 1994 (Hogemeyer 606)	EC 900	1.68	Pre-em	94 147	Forage Fodder	< 0.01 < 0.01	1995/10781
USA, Kansas, 1994 (Hogemeyer 688)	EC 900	1.68	Pre-em	90 155	Forage Fodder	< 0.01 < 0.01	1995/10781
USA, Kansas, 1994 (NC+ 155)	EC 900	1.68	Pre-em	88 113	Forage Fodder	< 0.01 < 0.01	1995/10781
USA, Kansas, 1994 (Pioneer 8771)	EC 900	1.68	Pre-em	95 121	Forage Fodder	< 0.01 < 0.01	1995/10781
USA, Mississippi, 1994 (Pioneer 8333)	EC 900	1.68	Pre-em	84 107	Forage Fodder	< 0.01 < 0.01	1995/10781
USA, Missouri, 1994 (Ciba 1482)	EC 900	1.68	Pre-em	102 111	Forage Fodder	< 0.01 < 0.01	1995/10781
USA, Nebraska, 1994 (Northrup King 1210)	EC 900	1.68	Pre-em	59 134	Forage Fodder	< 0.01 < 0.01	1995/10781
USA, Nebraska, 1994 (Northrup King 1210)	EC 900	1.68	Pre-em	106 141	Forage Fodder	< 0.01 < 0.01	1995/10781
USA, Oklahoma, 1994 (Triumph TR46)	EC 900	1.68	Pre-em	92 106	Forage Fodder	< 0.01 < 0.01	1995/10781
USA, Sth Dakota, 1994 (Pioneer 8855)	EC 900	1.68	Pre-em	96 152	Forage Fodder	< 0.01 < 0.01	1995/10781
USA, Texas, 1994 (G522DR)	EC 900	1.68	Pre-em	97 116	Forage Fodder	< 0.01 < 0.01	1995/10781
USA, Texas, 1994 (Pioneer 8212Y)	EC 900	1.68	Pre-em	107 127	Forage Fodder	< 0.01 < 0.01	1995/10781
USA, Texas, 1994 (TR 60G)	EC 900	1.68	Pre-em	90 109	Forage Fodder	< 0.01 < 0.01	1995/10781

'Forage' means entire plant without roots, sampled about late dough stage.
'Fodder' means the mature plant (without roots) except grain, sampled at normal grain harvest
Pre-em = broadcast treatment before crop has emerged

Table 92. Residue data summary of supervised trials on sorghum forage and fodder in USA, involving a single post-emergence treatment with dimethenamid.

SORGHUM Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method				
USA, Kansas, 1994 (NC+ 155)	EC 900	1.68	Post-em	65 90	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10781
USA, Texas, 1994 (G522DR)	EC 900	1.68	Post-em	65 84	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10781
USA, Kansas, 1994 (Pioneer 8771)	EC 900	1.68	Post-em	63 89	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10781
USA, Texas, 1994 (TR 60G)	EC 900	1.68	Post-em	58 77	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10781
USA, Sth Dakota, 1994 (Pioneer 8855)	EC 900	1.68	Post-em	63 119	Forage Fodder	≤ 0.01 < 0.01	1995/10781
USA, Colorado, 1994 (Cargill 577)	EC 900	1.68	Post-em	57 89	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10781
USA, Kansas, 1994 (Hogemeyer 606)	EC 900	1.68	Post-em	77 130	Forage Fodder	≤ 0.01 < 0.01	1995/10781
USA, Kansas, 1994 (Hogemeyer 688)	EC 900	1.68	Post-em	66 131	Forage Fodder	≤ 0.01 < 0.01	1995/10781
USA, Mississippi, 1994 (Pioneer 8333)	EC 900	1.68	Post-em	57 80	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10781
USA, Missouri, 1994 (Ciba 1482)	EC 900	1.68	Post-em	78 87	Forage Fodder	≤ 0.01 ≤ 0.01	1995/10781
USA, Nebraska, 1994 (Northrup King 1210)	EC 900	1.68	Post-em	41 116	Forage Fodder	< 0.01 < 0.01	1995/10781
USA, Nebraska, 1994 (Northrup King 1210)	EC 900	1.68	Post-em	76 111	Forage Fodder	≤ 0.01 < 0.01	1995/10781
USA, Texas, 1994 (Pioneer 8212Y)	EC 900	1.68	Post-em	83 103	Forage Fodder	< 0.01 < 0.01	1995/10781

'Forage' means entire immature plant without roots
'Fodder' means the mature plant (without roots) except grain, sampled at normal grain harvest
Post-em = broadcast spray after the crop has emerged

Sugar beet leaves or tops

Details of the residue trial designs and analytical methodologies used in the supervised residue trials summarized below are included in the previous section relating to sugar beet.

GAPs for dimethenamid-P on sugar beet, fodder beet and beetroot are:

	Country	Application		Max use/season		PHI (days)	Comments
		Method	kg ai/ha	No	kg ai/ha		
Sugar beet	Belgium	post-em	0.25 – 0.36	3	0.72		from 4-6 leaf stage
Sugar beet	Belgium	post-em	0.72	1			at 6-8 leaf stage
Sugar beet	Germany	post-em	0.65	1			at 6-8 leaf stage
Sugar beet	Netherlands	post-em	0.22	3			from 2-leaf stage
Sugar beet	Netherlands	post-em	0.33	2			from 4-leaf stage
Sugar beet	Netherlands	post-em	0.65	1			
Sugar beet	USA	post-em	0.63 – 1.1	1-2[1]	1.1	60	at 2-12 leaf stage
Fodder beet	Belgium	post-em	0.25 – 0.36	3	0.72		from 4-6 leaf stage
Fodder beet	Belgium	post-em	0.72	1			at 6-8 leaf stage
Fodder beet	Netherlands	post-em	0.22	3			from 2-leaf stage
Fodder beet	Netherlands	post-em	0.33	2			from 4-leaf stage
Fodder beet	Netherlands	post-em	0.65	1			
Beetroot	USA	post-em	0.63 – 1.1	1-2[1]	1.1	60	at 2-12 leaf stage

[1]) Split applications also recommended, generally involving pre-plant or pre-emergence treatment at 50-66% recommended rate and a pre-emergence or post-emergence treatment at 33-50% recommended rate, not closer than 14 days later

Table 93. Residue data summary of supervised trials on sugar beet leaves or tops in USA, involving a single post-emergence treatment with dimethenamid-P.

SUGAR BEET Country, year (variety)	Application				PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method	No				
USA,Idaho, 1998 (HMWS 91)	EC 720	0.68	Post-em	1	110	Tops	< 0.01	2004/5000740
USA, California, 1998 (Beta 4581)	EC 720	0.7	Post-em	1	105	Tops	< 0.01	2004/5000740
USA, California, 1998 (Spreckles SS-NB3)	EC 720	0.7	Post-em	1	109	Tops	< 0.01	2004/5000740
USA, Colorado, 1998 (ACH 177)	EC 720	0.7	Post-em	1	104	Tops	< 0.01	2004/5000740
USA, Michigan, 1998 (Crystal 308)	EC 720	0.7	Post-em	1	104	Tops	< 0.01	2004/5000740
USA, Minnesota, 1998 (KW 2249)	EC 720	0.7	Post-em	1	121	Tops	< 0.01	2004/5000740
USA, Nth Dakota, 1998 (ACH 192)	EC 720	0.7	Post-em	1	92	Tops	< 0.01	2004/5000740
USA, Texas, 1998 (Wrangler)	EC 720	0.7	Post-em	1	80	Tops	< 0.01	2004/5000740
USA,Idaho, 1998 (PM-6)	EC 720	0.72	Post-em	1	118	Tops	< 0.01	2004/5000740
USA, Minnesota, 1998 (VDH 66156)	EC 720	0.72	Post-em	1	107	Tops	< 0.01	2004/5000740
USA, Nth Dakota, 1998 (Crystal 222)	EC 720	0.72	Post-em	1	110	Tops	< 0.01	2004/5000740
USA, Wisconsin, 1998 (Beta 6836)	EC 720	0.72	Post-em	1	36 48 60 72 84	Tops	< 0.01 < 0.01 < 0.01 < 0.01 < 0.01	2004/5000740
USA, California, 1998 (Beta 4581)	EC 720	1.1	Post-em	1	105	Tops	< 0.01	2004/5000740

SUGAR BEET Country, year (variety)	Application				PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method	No				
USA, California, 1998 (Spreckles SS-NB3)	EC 720	1.1	Post-em	1	109	Tops	< 0.01	2004/5000740
USA, Colorado, 1998 (ACH 177)	EC 720	1.1	Post-em	1	104	Tops	< 0.01	2004/5000740
USA,Idaho, 1998 (HMWS 91)	EC 720	1.1	Post-em	1	110	Tops	< 0.01	2004/5000740
USA,Idaho, 1998 (PM-6)	EC 720	1.1	Post-em	1	118	Tops	< 0.01	2004/5000740
USA, Michigan, 1998 (Crystal 308)	EC 720	1.1	Post-em	1	104	Tops	< 0.01	2004/5000740
USA, Minnesota, 1998 (VDH 66156)	EC 720	1.1	Post-em	1	107	Tops	< 0.01	2004/5000740
USA, Nth Dakota, 1998 (ACH 192)	EC 720	1.1	Post-em	1	92	Tops	< 0.01	2004/5000740
USA, Nth Dakota, 1998 (Crystal 222)	EC 720	1.1	Post-em	1	110	Tops	< 0.01	2004/5000740
USA, Texas, 1998 (Wrangler)	EC 720	1.1	Post-em	1	80	Tops	< 0.01	2004/5000740
USA, Wisconsin, 1998 (Beta 6836)	EC 720	1.1	Post-em	1	36 48 60 72 84	Tops	< 0.01 < 0.01 < 0.01 < 0.01 < 0.01	2004/5000740
USA, Minnesota, 1998 (KW 2249)	EC 720	1.1	Post-em	1	121	Tops	< 0.01	2004/5000740

Water rates of 140-280 litres/ha (mostly 190), with oil-based surfactant
Last samples in each trial taken at commercial harvest time

Table 94. Residue data summary of supervised trials on sugar beet leaves or tops in France, Germany and Netherlands, involving a single post-emergence treatment with dimethenamid-P.

SUGAR BEET Country, year (variety)	Application				PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method	No				
Netherlands, Limburg, 1998 (Ewita)	EC 900	0.71	Post-em	1	0 12 42 114	Plant Tops	10.3 0.32 < 0.01 < 0.01	1999/10006 Bridging trial
Germany, Brandenburg, 1998 (Scarlett)	EC 900	0.65	Post-em	1	0 9 43 100	Plant Tops	13.2 0.43 < 0.01 < 0.01	1999/10006 Bridging trial
France, Pas de Calais, 1998 (Access)	EC 900	0.65	Post-em	1	0 15 52 114	Plant Tops	23.0 0.33 < 0.01 < 0.01	1999/10006 Bridging trial
France, Cote d'Or, 1998 (Rebecca)	EC 900	0.67	Post-em	1	0 14 43 127	Plant Tops	11.1 0.66 < 0.01 < 0.01	1999/10006 Bridging trial

'Plant' means entire young plant, including tops and roots

Water rates of about 300 litres/ha
Last samples in each trial taken at commercial harvest time

Table 95. Residue data summary of supervised trials on sugar beet leaves or tops in France, Germany, Netherlands and Switzerland, involving single post-emergence treatments with dimethenamid.

SUGAR BEET Country, year (variety)	Application				PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method	No				
France, Cote d'Or, 1998 (Rebecca)	EC 900	1.07	Post-em	1	0 14 43 127	Plant Tops	32.4 0.04 < 0.01 < 0.01	1999/10006 Bridging trial
France, Pas de Calais, 1998 (Access)	EC 900	1.08	Post-em	1	0 15 52 114	Plant Tops	39.0 0.05 < 0.01 < 0.01	1999/10006 Bridging trial
Germany, Brandenburg, 1998 (Scarlett)	EC 900	1.09	Post-em	1	0 9 43 100	Plant Tops	27.7 < 0.01 < 0.01 < 0.01	1999/10006 Bridging trial
Netherlands, Limburg, 1998 (Ewita)	EC 900	1.12	Post-em	1	0 12 42 115	Plant Tops	11.2 < 0.01 < 0.01 < 0.01	1999/10006 Bridging trial
Switzerland, Basel, 1996 (Kawavera)	EC 900	1.76	Post-em	1	0 30 60 91 136	Plant Tops 	99.0 < 0.01 < 0.01 < 0.01 < 0.01	1998/11036
Switzerland, Aargau, 1996 (not specified)	EC 900	1.8	Post-em	1	0 30 59 91 130	Plant Tops 	57.6 < 0.01 < 0.01 < 0.01 < 0.01	1998/11036

Table 96. Residue data summary of supervised trials on sugar beet leaves or tops in France, Germany, Netherlands and Switzerland, involving multiple post-emergence treatments with dimethenamid.

SUGAR BEET Country, year (variety)	Application				PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method	No				
Switzerland, Aargau, 1996 (not specified)	EC 900	0.43	Post-em	3	0 27 61 90 112	Plant Tops 	2.68 < 0.01 < 0.01 < 0.01 < 0.01	1998/11036

SUGAR BEET Country, year (variety)	Application				PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method	No				
Switzerland, Basel, 1996 (Kawavera)	EC 900	0.43	Post-em	3	0 29 61 92 120	Plant Tops	7.44 < 0.01 < 0.01 < 0.01 ≤ 0.01	1998/11036
Germany, Niedersachsen, 1996 (Reka)	EC 900	0.45	Post-em	3	0 30 65 91 125	Plant Tops	7.23 < 0.01 < 0.01 < 0.01 ≤ 0.01	1998/11036
Germany, Niedersachsen, 1996 (Sonja)	EC 900	0.46	Post-em	3	0 30 65 91 125	Plant Tops	2.66 < 0.01 < 0.01 < 0.01 ≤ 0.01	1998/11036
France, Cuvilly, 1995 (Annick)	EC 900	0.88	Post-em	3	0 133	Plant Tops	8.9, 5.3 ≤ 0.01, < 0.01	1996/11031
France, Antheuil Portes, 1995 (Loretta)	EC 900	0.9	Post-em	3	0 29 57 90 119	Plant Tops	10.4 , 8.0 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 ≤ 0.01, < 0.01	1996/11031
France, Apilly, 1995 (Dyna)	EC 900	0.9	Post-em	3	0 30 59 94 142	Plant Tops	25.4 , 19.3 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 ≤ 0.01, < 0.01	1996/11031
France, Aubigny en Plaine, 1995 (Riposte)	EC 720	0.91	Post-em	3	0 31 60 90 138	Plant Tops	17.8 , 12.6 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 ≤ 0.01, < 0.01	1996/11031
France, Mesnil la Comtesse, 1995 (Liberte)	EC 900	0.95	Post-em	3	0 139	Plant Tops	5.7, 3.8 ≤ 0.01, < 0.01	1996/11031
France, Viapre le Petit, 1995 (Cardinal)	EC 900	0.95	Post-em	3	0 30 59 90 133	Plant Tops	7.3, 4.4 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 ≤ 0.01, < 0.01	1996/11031
France, Aubigny en Plaine, 1995 (Riposte)	EC 720	0.44	Post-em	4	0 31 60 90 138	Plant Tops	5.1, 5.0 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 ≤ 0.01, < 0.01	1996/11031

SUGAR BEET Country, year (variety)	Application				PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method	No				
France, Antheuil Portes, 1995 (Loretta)	EC 900	0.45[1]	Post-em	4	0 29 57 90 119	Plant Tops	2.5, 2.4 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	1996/11031
France, Apilly, 1995 (Dyna)	EC 900	0.45[1]	Post-em	4	0 30 59 94 142	Plant Tops	13.7, 12.0 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	1996/11031
France, Cuvilly, 1995 (Annick)	EC 900	0.46	Post-em	4	0 133	Plant Tops	2.9, 2.9 < 0.01, < 0.01	1996/11031
France, Viapre le Petit, 1995 (Cardinal)	EC 900	0.46	Post-em	4	0 30 59 90 133	Plant Tops	1.8, 1.6 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	1996/11031
France, Mesnil la Comtesse, 1995 (Liberte)	EC 900	0.47	Post-em	4	0 139	Plant Tops	1.0, 1.0 < 0.01, < 0.01	1996/11031

'Plant' means entire young plant, including tops and roots
Water rates of 350-450 litres/ha, with oil-based surfactant (France), 190-210 litres/ha (Germany), 450-500 litres/ha (Switzerland)
Last samples in each trial taken at commercial harvest time
[1]) Tank mix with phenmedipham and ethofumesate

FATE OF RESIDUES IN STORAGE AND PROCESSING

Processing

The Meeting received information on the fate of incurred residues during the processing of peanuts, potatoes, maize, soya beans and sugar beet treated in the field with exaggerated rates of dimethenamid or dimethenamid-P (potatoes and sugar beet).

Peanuts

Two field trials were conducted in USA (Georgia), where dimethenamid was applied as a single pre-emergence broadcast treatment at an exaggerated (5×) rate of 8.4 kg ai/ha within one day after planting (Laban, 1995) [Ref: 1995/10138]. Mature peanuts (with pod) were harvested 135 and 147 days after treatment using commercial combine harvesters, with samples (50 kg) being diverted into a research collection hopper. Kernels and shells were separated at the laboratory and analysed for dimethenamid using Method AM-0884-0193-1, the limit of quantification being 0.01 mg/kg and recovery rates of 87 ± 7% (shells) and 96 ± 6% (kernels) at a fortification level of 0.01 mg/kg.

Residues of dimethenamid were detected at levels of 0.01–0.012 mg/kg in peanut shells (mean 0.011 mg/kg). Residues were not detectable in any of the kernel samples and further processing of the kernels into meal and oil was therefore not undertaken.

Potatoes

In one field trial in USA (Idaho), dimethenamid-P was applied at an exaggerated rate (5×) of 7.0 kg ai/ha as a pre-emergence broadcast spray, 7 days after planting and again 3 months later as a post-emergence treatment, 40 days before commercial harvest (Wofford, Guirguis and Riley, 1999) [Ref: 1999/5018].

Mature potatoes (min. 77 kg) were harvested by hand, 40 days after the last treatment and were tub-washed in water for 5–10 minutes to simulate commercial flume washing, culled, peeled using an abrasive peeler (25–30 seconds), trimmed and sliced (about 16mm thick) using a restaurant-style food slicer. For processing into chips, the sliced potatoes were rinsed in hot water to remove the free starch, fried in a deep fat fryer at 163–191°C for 60–90 seconds, then drained and salted by hand. For potato flake production, the washed potatoes were batch steam peeled using a pressure steam peeler (45 seconds at 5.6–6.0 kg/cm^2) and a restaurant-style scrubber (30 seconds), cut into 1–1.5 cm slabs which were then spray-washed in cold tap water for 30 seconds to remove free starch), pre-cooked in a 150 litre steam jacketed kettle at 70–77°C for 20 minutes and cooled to about 26°C. The cooled potato slabs were steam cooked at 94–100°C for 40–42 minutes using an atmospherically flowing steam batch style steam cooker, mashed using a modified meat grinder and mixed with an emulsion of pre-weighed additives (emulsifier, sodium bisulphite, sodium acid pyrophosphate, butylated hydroxyanisole and citric acid) using a bakery-style food mixer. The wet mash was then dried into thin sheets using a single-drum laboratory dryer and milled into flakes using a fruit press hammermill.

Samples of tubers, chips, wet peel and flake were analysed for dimethenamid using Method AM-0884-0193-1 with a limit of quantification of 0.01 mg/kg and recovery rates of 91% (chips), 76% (flakes), 77% (wet peel) and 77% (tubers) at fortification levels of 0.01–0.02 mg/kg. No residues above 0.01 mg/kg were reported in any control samples, tubers or any of the processed commodities.

Soya bean

In two USA field trials, dimethenamid was applied as a pre-emergence broadcast treatment at an exaggerated (5×) rate of 8.4 kg ai/ha within 3 days after planting (Jiminez, 1991) [Ref: 1991/11878], Jiminez, 1992 [Ref: 1992/12444].

Mature beans (18–55 kg) were harvested 137 and 157 days after treatment using mechanical plot harvesters, and were dried in a forced air oven for 10 minutes (60–77°C) before being cleaned by aspiration, screened and cracked into 2-6 pieces, with the hulls being further air aspirated and the kernels being pre-heated to 66–74°C and flaked to 0.2–0.3 mm thickness using a flaking roll. The flaked kernels were solvent extracted 3-4 times with hexane in a steam-jacketed batch extractor for 30 minutes at 49–61°C. After evaporation of the hexane, the remaining crude oil was refined in a laboratory oil refining machine for 30 minutes at 250 rpm at 68–72°C after the addition of 1–3% water, with the resulting lecithin fraction being collected for analysis. The crude oil was then combined with 12 degree Baume NaOH and further refined for 30 minutes at 250 rpm at 20–24°C then 20 minutes at 70 rpm at 60-65°C, refrigerated for 12 hours, decanted and filtered to obtain soapstock and the refined oil.

In the 1991 study, the initial soya beans, hulls, kernels, meal, crude oil, degummed oil, crude lecithin, refined oil and soapstock were analysed for dimethenamid and its oxalamide metabolite using Method AM-0850-0291-0, limit of quantification being 0.02 mg/kg and average recovery rates of 131 ± 16% (dimethenamid) and 78 ± 47% (oxalamide) at a fortification levels of 0.02–0.2 mg/kg.

In the 1992 trial, the refined oil was further processed by bleaching (heating a mixture of oil and bleaching earth to 84–100°C under vacuum for 10–15 minutes), hydrogenation (reaction with a nickel catalyst under vacuum at 143–154°C then under 1 kPa hydrogen at 166–190°C) and then deodorised by heating to 220–230°C for 30 minutes under vacuum and adding 0.005% citric acid

(1ml/100 g oil) during cooling, before breaking the vacuum. Method BS2304 was used to measure residues of dimethenamid in whole grain, grain dust, hulls, solvent extracted meal, soapstock and oil (degummed, crude, refined and deodorised/refined), with a limit of quantification of 0.01 mg/kg and an average recovery rate of 83 ± 15% at fortification levels of 0.01 mg/kg and 0.1 mg/kg.

In addition, samples of hulls, meal, crude oil and refined oil from the 1992 study were analysed for residues of the sulfonate metabolite using Method AM-0868-0392-1, with a 0.05 mg/kg limit of quantification and recovery rates of 66% (hulls), 78% (meal), 90% (crude and refined oil) at a fortification levels of 0.05 mg/kg. (Smith, 1993) [Ref: 1993/11748].

No residues of either dimethenamid or its oxalamide and sulfonate metabolites were detected at levels above the reported LOQs (0.02 mg/kg and 0.01 mg/kg in the 1991 and 1992 studies respectively) in the dry beans or in any of the processing fractions.

Sugar beet

In one field trial in USA (Idaho), dimethenamid-P was applied at an exaggerated rate (5×) of 3.5 kg ai/ha as a post-emergence broadcast spray, when the sugar beets were at the 8-leaf stage, 40 days after planting. (Haughey, Guirguis and Riley, 1999) [Ref: 1999/5020].

Mature sugar beet roots (150kg min) were harvested by hand, 110 days after the last treatment and were analysed for dimethenamid using Method AM-0884-0193-1 with a limit of quantification of 0.01 mg/kg and a recovery rate of 77% at a fortification level of 0.01 mg/kg. Residues were not detected in any of the sugar beet root samples and therefore no further processing was undertaken.

Maize

In two USA field trials, dimethenamid was applied at an exaggerated (5×) rate of 8.4 kg ai/ha, as either a single pre-plant broadcast treatment (Guirguis, 1990) [Ref: 1990/11094] or a single pre-emergence broadcast treatment, 3 days after planting (Jiminez, 1992) [Ref: 1992/12433].

Mature corn was mechanically harvested 189 (pre-plant trial) and 139 days (pre-emergence trial) and processed using simulated commercial wet and dry processing procedures. The wet processing involved air-drying at 61–71°C to achieve a 15% moisture content, screening and aspiration to remove dust, chaff, etc. and steeping for 22–48 hours at 49–54°C in 0.1–0.2% sulphur dioxide solution. The steeped corn was coarse ground and flotation separation was used to separate the germ from the hulls and endosperm. After washing the germ fraction to remove the starch, it was dried to 7–10% moisture. The remaining starch-gluten-coarse hull fraction was ground and washed through a 3mm screen basket and a 43 micron screen was used to separate the starch and gluten from the coarse material, which was collected and dried to 15% moisture content. The washing water containing the starch and gluten fractions was refrigerated for 12 hours and the starch and gluten separated by high speed centrifuging. The dry processing involved the same air drying, screening and aspiration procedures as above, with the cleaned grain being adjusted to 22% moisture before being tempered for 2.5 hours and cracked using an impact mill. The resulting corn stock was dried and cooled to 32°C, then screened (3 mm shaker screen) to separate the hulls and larger fractions, these being aspirated to remove the lighter hulls and a gravity separator was used to obtain the germ and large grits fractions. Other grit sizes, meal and flour were separated using different sieves ranging from 2 mm to 0.25 mm.

In both the wet and dry processing, the germ fraction was adjusted to 12% moisture content and heated to 88-99°C and the oil extracted using an Anderson expeller, with the residual oil in the press cake being extracted three times with hexane in a steam jacketed batch extractor (30 minutes at 49–60°C) and separated from the miscella by vacuum evaporation at 75–85°C. The crude oil was then combined with 16 degree Baume NaOH and further refined for 30 minutes at 250 rpm at 20-24°C then 20 minutes at 70 rpm at 60–65°C, refrigerated for 12 hours, decanted and filtered to obtain

soapstock and the refined oil. This oil was then heated with 1% bleaching earth to 84–100°C under vacuum for 10–15 minutes before being filtered and deodorised by heating to 220–230°C for 30 minutes under vacuum and adding 0.005% citric acid (1 mL/100 g oil) during cooling, before breaking the vacuum.

In the 1990 study, corn and the processing fractions were analysed for dimethenamid and its oxalamide metabolite using Method AM-0850-0790-0, limit of quantification being 0.01 mg/kg, with recovery rates of between 70% and 120% for dimethenamid and the oxalamide in most fractions except the oils and soapstock, where the recovery rates were variable, ranging from about 10% to 190%, particularly for the oxalamide. Fortification levels were 0.01 mg/kg and 0.1 mg/kg.

Method BS2304 was used in the 1992 study to measure residues of dimethenamid in whole grain, grain dust, grits, coarse meal, meal, coarse gluten starch, gluten, starch, process water, flour, hulls, solvent extracted press cake, soapstock, crude, refined, bleached oil fractions and deodorised oil and distillates, with a limit of quantification of 0.01 mg/kg and an average recovery rate of 87 ± 15% (n=50) at fortification levels of 0.01 mg/kg, 0.02 mg/kg and 0.1 mg/kg. Low recovery rates of 46% and 57% were reported in grain dust at fortification levels of 0.01 mg/kg and 0.1 mg/kg respectively.

In addition, samples of grain, meal, flour, grits, crude and refined oil from the 1992 study were analysed for residues of the sulfonate metabolite using Method AM-0868-0392-1, with a 0.05 mg/kg limit of quantification and recovery rates of 72% (grain), 74% (flour), 97% (grits), 60% (meal), 58-66% (crude oil) and 64–90% (refined oil) at fortification levels of 0.05–0.5 mg/kg. (Smith, 1992) [Ref: 1992/12472].

No residues of either dimethenamid or its oxalamide and sulfonate metabolites were detected at levels above the reported LOQs (0.01 mg/kg and 0.05 mg/kg in the 1990 and 1992 studies respectively) in whole grain or in any of the processing fractions.

Table 97. Residues of dimethenamid in raw and processed peanuts, soya beans and maize from processing studies in the USA.

PROCESSING Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method					
PEANUTS								
USA, Georgia, 19945 (GK-7)	EC 900	8.4	Pre-em	135	 Kernals Shells	<u>Dimethenamid</u> < 0.01 0.011		1995/10138
USA, Georgia, 1997 (Florunner)	EC 900	8.4	Pre-em	140+7 [1]	Pods	< 0.01 < 0.01		1995/10138
SOYA BEANS								
USA, Minnesota, 1988 (Weber)	EC 720	8.4	Pre-em	157	 Beans Hulls Kernels Meal Crude oil Degummed oil Crude lecithin Refined oil Soapstock	<u>Dimethenamid</u> < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02	<u>Oxalamide</u> < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02	1991/11878

PROCESSING Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method					
USA, Ohio, 1991 (Pioneer 9361)	EC 900	8.4	Pre-em	137		Dimethenamid	Sulfonate	1992/12444 1993/11748
					Beans	< 0.01	< 0.05	
					Dust	< 0.01		
					Hulls	< 0.01	< 0.05	
					Meal	< 0.01	< 0.05	
					Crude oil	< 0.01	< 0.05	
					Degummed oil	< 0.01		
					Crude lecithin	< 0.01		
					Refined oil	< 0.01	< 0.05	
					Bleached oil	< 0.01		
					Soapstock	< 0.01		
MAIZE								
USA, Ohio, 1988 Pioneer 3352	EC720	8.4	Pre-plant	189	Dry Milling	Dimethenamid	Oxalamide	1990/11094
					Grain	< 0.01	< 0.01	
					Germ	< 0.01	< 0.01	
					Hulls	< 0.01	< 0.01	
					Flour	< 0.01	< 0.01	
					Large grits	< 0.01	< 0.01	
					Meal	< 0.01	< 0.01	
					Press cake	< 0.01	< 0.01	
					Crude oil	< 0.01	< 0.01	
					Soapstock	< 0.01	< 0.01	
					Refined oil	< 0.01	< 0.01	
					Wet milling			
					Grain	< 0.01	< 0.01	
					Hulls	< 0.01	< 0.01	
					Germ	< 0.01	< 0.01	
					Gluten	< 0.01	< 0.01	
					Starch	< 0.01	< 0.01	
					Press cake	< 0.01	< 0.01	
					Crude oil	< 0.01	< 0.01	
					Refined oil	< 0.01	< 0.01	
					Soapstock	< 0.01	< 0.01	

PROCESSING Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)		Reference & Comments
	Form	kg ai/ha	Method					
USA, Ohio, 1991 Pioneer 3352	EC900	8.4	Pre-em	137	<u>Dry Milling</u>	<u>Dimethenamid</u>	<u>Sulfonate</u>	1992/12432
					Grain	< 0.01	< 0.05	
					Grain dust	< 0.01		
					Grits	< 0.01	< 0.05	
					Coarse meal	< 0.01		
					Meal	< 0.01	< 0.05	
					Flour	< 0.01	< 0.05	
					Hulls	< 0.01		
					Press cake	< 0.01		
					Crude oil	< 0.01	< 0.05	
					Soapstock	< 0.01		
					Refined oil	< 0.01	< 0.05	
					Bleached oil	< 0.01	< 0.05	
					Deodor oil	< 0.01	< 0.05	
					Distillates	< 0.01		
					<u>Wet milling</u>			
					Grain	< 0.01	< 0.05	
					Hulls	< 0.01		
					Gluten	< 0.01		
					Starch	< 0.01		
					Process water	< 0.01		
					Press cake	< 0.01		
					Crude oil	< 0.01	< 0.05	
					Refined oil	< 0.01	< 0.05	
					Bleached oil	< 0.01	< 0.05	
					Deodor oil	< 0.01	< 0.05	
					Distillates	< 0.01		
					Soapstock	< 0.01		

Table 98. Residues of dimethenamid-P in raw and processed potatoes from processing studies in the USA.

PROCESSING Country, year (variety)	Application			PHI, (days)	Portion analysed	Residues (mg/kg)	Reference & Comments
	Form	kg ai/ha	Method			Dimethenamid-P	
POTATOES							
USA, Idaho, 1998 (Russet Burbank)	EC 720	7.0+ 7.0	Pre-em+ Post-em (50cm)	40	Tubers	< 0.01	1999/5018
					Chips	< 0.01	
					Flakes	< 0.01	
					Wet peel	< 0.01	

NATIONAL RESIDUE DEFINITIONS

The Meeting was provided with national residue definitions established for dimethenamid-P in USA and the European Community. These are listed below.

USA: “dimethenamid, 1(R,S)-2-chloro-N-[(1-methyl-2-methoxy)ethyl]-N-(2,4-dimethyl-thien-3-yl)-acetamide applied as either the 90:10 or 50:50 S:R isomers”

EU: “dimethenamid-P including other mixtures of constituent isomers (sum of isomers)”

RESIDUES IN FOOD IN COMMERCE OR AT CONSUMPTION

No information was received on residues of dimethenamid-P in commerce or at consumption.

APPRAISAL

Residue and analytical aspects of the herbicide dimethenamid-P (S-dimethenamid) were considered for the first time by the present Meeting. Dimethenamid-P is one of the enantiomers in dimethenamid, the other being the herbicidally inactive dimethenamid-M (R-dimethenamid). In this Report, the term 'dimethenamid' refers to the 50:50 mixture of R-dimethenamid and S-dimethenamid while the term 'dimethenamid-P' refers to the herbicidally active S-dimethenamid, containing up to 10% of the inactive enantiomer.

When applied as pre-plant, pre-emergent or early post-emergent treatments, this chloroacetamide herbicide is active against germinating broad-leaf and grass weeds, being taken up through the coleoptiles (grass seedlings) or the roots and emerging shoots (dicotyledonous seedlings) and reducing cell division and growth.

Chemical name:

IUPAC: S-2-chloro-N-(2,4-dimethyl-3-thienyl)-N-(2-methoxy-1-methyl-ethyl)acetamide

CAS: (S)-2-chloro-N-(2,4-dimethyl-3-thienyl)-N-[-2-methoxy-1-methyl-ethyl]acetamide

The manufacturer submitted studies on metabolism, analytical methods, supervised field trials, processing, freezer storage stability and rotational crop residues. Most of these studies involved the racemic mixture (dimethenamid) with supporting or bridging studies with dimethenamid-P also being provided. Information on GAP was submitted by Netherlands.

The following abbreviations are used for the metabolites discussed below:

M7	2-chloro-N-(2,4-dimethyl-3-thienyl)-N-(2-hydroxy-1-methylethyl) acetamide
M23 (oxalamide)	2,2'-dithiobis(N-(2,4-dimethyl-3-thienyl)-N-(2-methoxy-1-methylethyl) acetamide)
M25	2-[N-(2,4-dimethyl-3-thienyl)-N-(2-methoxy-1-methylethyl) amino]-2-oxoethyl-cysteine
M27 (sulfonate)	2-[N-(2,4-dimethyl-3-thienyl)-N-(2-methoxy-1-methylethyl)-amino]-2-oxoethyl-sulfonic acid
M28	2-[N-(2,4-dimethyl-3-thienyl)-N-(2-methoxy-1-methylethyl) amino]-2-oxoethyl-sulfonic acid
M29	sulfoxide of 2-[N-(2,4-dimethyl-3-thienyl)-N-(2-methoxy-1-methylethyl) amino]-2-oxoethyl-N-malonyl cysteine
M30	sulfoxide of 2-[N-(2,4-dimethyl-3-thienyl)-N-(2-methoxy-1-methylethyl) amino]-2-oxoethyl thiolactic acid
M31	sulfoxide of 2-[N-(2,4-dimethyl-3-thienyl)-N-(2-methoxy-1-methylethyl) amino]-2-oxoethyl thioglycolic acid

Animal metabolism

The Meeting received animal metabolism studies for dimethenamid on lactating goats and laying hens. Comparison of racemic dimethenamid with dimethenamid-P toxicology has been possible for a number of types of study. These have shown that there is little difference in the toxicological profile or, where appropriate, the NOAEL values of these materials. Consequently, the Meeting concluded that the metabolism studies involving racemic dimethenamid could also apply to dimethenamid-P.

Rats

Dimethenamid was well absorbed and extensively metabolized by rats, with about 90% of the administered dose being eliminated within 168 h and only 1–2% of unchanged dimethenamid was detected in excreta. About 40 metabolites were found in organic extracts using thin layer chromatography (TLC) analysis with 20 of these being identified.

Goats

A lactating goat was orally administered [3-^{14}C-thienyl]dimethenamid for four consecutive days at a dose equivalent to 223 ppm in the diet. In this study, 36% of the administered dose was excreted in either urine or faeces and less than 2.3% TRR remained in animal tissues (0.02% in milk). In milk, residues reached a plateau after 3 days, with a maximum of 0.98 mg/kg dimethenamid equivalents reported 7 h after the 3rd dose. Concentrations in kidney, fat, muscle and liver were 9.9, 1.0, 0.97 and 17 mg/kg, respectively. No residues of the parent compound were found, and metabolites reported at levels higher than 1.0 mg/kg were in kidney (M7 at 2.4 mg/kg) and in liver (M25 at 1.2 mg/kg, M22 at 1.0 mg/kg).

Because of the low recovery rate in this study, partly explained by the loss of a urine sample and reduced faecal production and the exhibition of toxicity symptoms (loss of appetite and decrease in body weight), a supplementary material balance study was also conducted, where a single goat was dosed once with [3-^{14}C-thienyl]dimethenamid (equivalent to 250 ppm in the diet) and radioactivity measured in urine, faeces and milk over the subsequent 5 days. In this second study, more than 59% (urine) and 28% (faeces) of the TRR was excreted by the end of the 5-day study, with 0.09% TRR being measured in milk.

Hens

Laying hens (3) were fed with [3-^{14}C-thienyl]dimethenamid for four days at a dose rate equivalent to 167 ppm in the diet. Elimination of the C^{14} was rapid, with more than 77 % of the total applied dose being found in the excreta, less than 0.5% in liver, between 0.3% and 0.4% in muscle, 0.07% in fat and 0.02% or less in eggs. Radiolabel concentrations in egg white increased from 0.19 mg/kg to 0.3 mg/kg dimethenamid equivalents over the four day period with the related egg yolk residues increasing from 0.01 mg/kg to 0.62 mg/kg over the same period. Residue levels in fat, muscle (breast), muscle (thigh) and liver were 0.29, 0.45, 0.58 and 8.33 mg/kg TRR, respectively.

Residues of dimethenamid were identified in fat (0.1 mg/kg or 36% of the fat radiolabel), with the major identified metabolites being M3 (0.43 mg/kg or 5% liver TRR) and M8 (0.65 mg/kg or 7.8% liver TRR). Up to 21 other metabolites were detected in tissues and eggs, all at less than 10% of the TRR, but these were not identified.

Dimethenamid was extensively metabolized by rats, goats and hens with 1.2% (hens) and 2.3% (goats) of the applied dose remaining in tissues after 4–5 days and 0.02% being found in milk and eggs. The proposed metabolic pathway was via glutathione conjugation, the formation of cysteine, mercapturate thioglycolic sulfoxide conjugates, with other pathways involving

demethylation and reductive dechlorination. No residues of the parent compound were reported in milk or any animal tissues except in fat of hens, where dimethenamid residues of about 0.1 mg/kg were reported.

Plant metabolism

The Meeting received plant metabolism studies for dimethenamid in soya beans, maize and sugar beet. While these studies were conducted using dimethenamid, the Meeting considered that dimethenamid-P would exhibit the same metabolic profile and agreed that the plant metabolism studies involving dimethenamid could apply to dimethenamid-P.

Soya beans

In a metabolism study in soya beans treated with radiolabelled dimethenamid to simulate pre-emergence broadcast application (1.68 kg ai/ha and 3.36 kg ai/ha), dimethenamid was rapidly metabolized to a number of polar metabolites (20–30), most being present at low levels (< 0.01 mg/kg or < 3% TRR). No parent compound was detected in any of the samples, even at the 2× treatment rate. Metabolites present at levels higher than 10% TRR were M23 (17% in forage), M27 (11% in hay) and M30/M31 (12% in mature seeds).

Maize

The metabolic fate of dimethenamid was studied in maize plants, where radiolabelled dimethenamid was applied as a pre-emergence broadcast spray (1.68 kg ai/ha and 4.4 kg ai/ha). Translocation of radiocarbon to grain was minimal. Dimethenamid was rapidly metabolized to several weak acids and other highly polar residues, with many individual fractions present in very small amounts. No dimethenamid residues were found in any of the forage, silage, grain or straw samples, even at the exaggerated (4.4 kg ai/ha) application rate and no metabolites were present at levels greater than 0.05 mg/kg or 10% TRR. The most common metabolites found in foliage were M23, M27 and M30/M31

Sugar beet

In a sugar beet metabolism study, labelled dimethenamid was applied three times to sugar beet plants at a rate equivalent to 0.45 kg ai/ha per treatment. Levels of ^{14}C in roots were about 3.5 times lower than in the tops. No parent residues were detected in any samples, with the major identified metabolites being M23, M27, M28 and M29 in the roots and M27, M29 and M30 in the tops. Numerous polar metabolites were also characterized. All the identified metabolites were present at levels below 10% of the TRR or < 0.01 mg/kg dimethenamid equivalents.

Dimethenamid is rapidly metabolized in plants and metabolism occurs through similar pathways in the three crops studied. The proposed metabolic pathway in plants involves conjugation of dimethenamid with glutathione and hydrolysis to the cysteine conjugate, both being considered transient intermediates undergoing rapid oxidation, deamination and/or decarboxylation to form many relatively polar metabolites, all of which are generally present at levels of < 0.05 mg/kg or less than 10% of the TRR. Bound radiocarbon increased with time, indicating incorporation of residues into the plant matrix. No parent compound was detected in any of the plant tissues at any sampling interval.

Environmental fate

Dimethenamid-P is stable in aqueous buffered solutions at pH 5, 7 and 9 (25°C in the absence of light) for at least 31 days. No information was provided on the formation of hydrolysis products, but it is not expected that hydrolytic processes will be a significant factor in the environmental degradation of dimethenamid-P and dimethenamid.

The Meeting received information on the comparative behaviour and fate of dimethenamid-P and dimethenamid in aerobic soil. No significant differences were observed in the degradation rates of dimethenamid and dimethenamid-P when the soil was mixed with dimethenamid or dimethenamid-P at a concentration of about 2 mg ai/kg (to simulate the concentration within the top 5 cm of soil following a pre-emergence broadcast field application at 1.68 kg ai/ha) and incubated under aerobic conditions at 23°C for 182 days. The calculated DT_{50} value for the aerobic degradation of both compounds in clay loam soil at 23°C was 10 days. After the 182 day incubation period, $^{14}CO_2$ accounted for 28–29% TRR for both treatments. Non-extractable residues were found to increase to 40% TRR.

Soil metabolites, identified following exaggerated rate incubations (21 days, 9.5 mg/kg dry soil), were similar for both dimethenamid and dimethenamid-P, and none of these exceeded 9% of the TRR.

In a confined rotational crop study, labelled dimethenamid was applied to maize and soya bean crops as simulated pre-emergence treatments. The rotational crops used in this study were winter wheat (planted 141 DAT), spring wheat (planted 322 DAT), lettuce and carrots (planted 332 DAT).

The TRRs for all rotational crop samples from plots treated at a rate equivalent to 1.68 kg ai/ha were between 0.01 mg/kg and 0.06 mg/kg in carrot roots, carrot tops, lettuce leaves, wheat grain and immature wheat plants, with residues of 0.12 mg/kg and 0.17 mg/kg being reported in summer and winter wheat straw respectively. Total radioactive residues in the soya bean samples from the higher (2×) treatment rates were generally twice the above levels while in the high rate (2.6×) maize plots, samples generally contained residues 2-3 times higher than the above.

Metabolites M23, M27 and M30 were identified in the rotational crops, but all at levels below 0.01 mg/kg. Unidentified metabolites were also < 0.01 mg/kg and residues of dimethenamid were not detected in any samples.

These results indicate that the potential exposure of consumers to residues of dimethenamid from rotational crops is insignificant.

While the above crop rotation study was conducted using dimethenamid, the Meeting considered that dimethenamid-P should exhibit the same metabolic profile as the racemic mixture, and agreed that the results of these crop rotation studies could be applied to dimethenamid-P.

Methods of analysis

The Meeting received information on methods for the analysis of dimethenamid and two metabolites (M23 and M27) in plant and animal tissues. The methods developed for dimethenamid do not differentiate between the isomers and are therefore applicable for analysis of matrices treated with either dimethenamid or dimethenamid-P.

Most of the methods reported to the Meeting and used in the supervised residue trials were based on methanol:water extraction and clean-up using reversed phase C_{18} solid phase extraction columns, partitioning the aqueous eluate with toluene and silica gel column chromatography with ethyl acetate:cyclohexane elution. Analysis in the earlier studies was by CG equipped with thermioinic detector (TSD) and in the later studies, by GC-MS. In animal matrices and most plant matrices, the reported limit of quantification was 0.01 mg/kg, with mean recovery rates of 75% to 105%.

Several earlier methods, designed to measure both the parent compound and the M23 (oxalamide) metabolite also included an additional step to methylate the M23 metabolite by adding diazomethane, but the variable recovery rates in validation studies and in field trials resulted in these

methods being discontinued. Supervised residue trials using these methods were not considered in this appraisal.

A multi-residue method, based on the DFG Method S 19 has been developed, involving acetone:water (2:1) extraction, ethyl acetate:cyclohexane (1:1) partitioning, gel permeation and mini silica gel column cleanups and GC-MS analysis. The modification used in this method was the use of ethyl acetate:cyclohexane rather than dichloromethane in the clean-up partitioning step. The reported limit of quantification for this method was 0.01 mg/kg and mean recovery rates were 76–79%.

Stability of pesticide residues in stored analytical samples

The Meeting received information on the stability of dimethenamid and dimethenamid-P in various commodities under freezer storage (-16 to -20 °C). Residue degradation of dimethenamid during storage was less than 20% in maize forage, grain and fodder stored for 21 months, less than 10% in soya bean forage and beans stored for 16 months and no degradation was reported in onion bulbs stored for 9 months. Dimethenamid-P residues did not degrade in spring onion samples stored at -16°C for 56 weeks.

Definition of the residue

Metabolism studies in animals (goats and hens) and plants (maize, soya beans) indicate that dimethenamid is rapidly and extensively metabolized, with a number of polar metabolites being produced, all at low levels (less than 10% TRR). The metabolic pathway is similar in the crops investigated. Residues of the parent compound were only found at a low level in poultry fat following administration of a highly exaggerated dose rate.

Based on the available comparative animal and soil metabolism studies and noting that the only difference between dimethenamid and dimethenamid-P was in the enantiomer ratio (50:50 vs 90:10), the residue profile and metabolic behaviour of dimethenamid-P is expected to be the same as for dimethenamid.

The available analytical methods to measure dimethenamid residues are also suitable for measuring dimethenamid-P residues, but they do not differentiate between the enantiomers.

The Meeting noted that national residue definitions for dimethenamid and/or dimethenamid-P included:

“dimethenamid, applied as either the 90:10 or 50:50 S:R isomers” (USA)

“dimethenamid-P including other mixtures of constituent isomers (sum of isomers)” (EU)

The Meeting concluded that for both animal and plant commodities, the definition of the residue for compliance with MRLs and estimation of dietary intake should be ‘dimethenamid-P and its enantiomer’ and noted that this residue definition could apply to residues arising from the use of either dimethenamid-P or dimethenamid.

Results of supervised trials on crops

The Meeting received supervised trials involving dimethenamid on onions (bulb), sweetcorn, beans (dry), soya beans, sugar beet, maize, sorghum and peanuts and trials with dimethenamid-P were also provided for spring onions, potato, sugar beet, maize and grass seed crops.

The Meeting agreed that because dimethenamid-P exhibited the same metabolic behaviour as dimethenamid, the results of trials involving dimethenamid could be applied to dimethenamid-P.

The Meeting also agreed that in trials involving pre-plant or pre-emergence applications and where the mature commodities were sampled at normal commercial harvest, the results could be used to support recommendations for MRLs, irrespective of the PHI used in the trials, since the label claims for these treatment methods were more related to crop growth stages (i.e. crop emergence and harvest) than to the number of days between treatment and harvest. In addition, the Meeting agreed that where the reported residues were below the limits of quantification in trials involving application rates higher than GAP and in the case of post-emergence applications where the PHIs were shorter than GAP, these results could be used to support recommendations for MRLs at the limit of quantification.

For commodities where the supporting trials used in the estimation of maximum residue levels all reported residues below the limit of quantification, even at exaggerated rates, the Meeting, taking into account the results of the plant metabolism studies, agreed to estimate STMRs, median residue levels, HRs and highest residue levels of 0 mg/kg, indicating that residues are not expected.

Onion, bulb

Field trials involving single post-emergence treatments with dimethenamid were made available to the Meeting from the USA. In all trials, residues were below the limit of quantification (0.01 mg/kg).

GAP in USA is for post-emergence use (max 1.1 kg ai/ha, PHI 30 days) and while there were no trials available that matched the USA GAP, the Meeting agreed to use the results from 8 dimethenamid trials from the USA with PHIs matching the USA PHI (30 days) but at higher application rates (1.68 kg ai/ha), since these all reported residues of < 0.01 mg/kg. The combined results were < 0.01 (8) mg/kg.

The Meeting estimated an STMR value of 0 mg/kg and a maximum residue level of 0.01 mg/kg (*) for onion, bulb. The HR was 0 mg/kg.

Garlic

The Meeting noted that GAP existed for dimethenamid-P in USA. This GAP is the same as that established for onion, bulb, and the Meeting agreed that the available residue data for onion, bulb could be extrapolated to garlic.

The Meeting estimated an STMR value of 0 mg/kg and a maximum residue level of 0.01 mg/kg (*) for garlic. The HR was 0 mg/kg.

Shallot

The Meeting noted that GAP existed for dimethenamid-P in USA. This GAP is the same as that established for onion, bulb, and the Meeting agreed that the available residue data for onion, bulb could be extrapolated to shallot.

The Meeting estimated an STMR value of 0 mg/kg and a maximum residue level of 0.01 mg/kg (*) for shallot. The HR was 0 mg/kg.

Spring onion

Field trials (6) involving single post-emergence treatments of dimethenamid-P were provided from Canada and USA, all reporting < 0.01 mg/kg, but no matching GAP information was available for dimethenamid-P.

The Meeting agreed not to estimate a maximum residue level, STMR or HR for spring onion.

Sweet corn

Field trials involving single pre-emergence and post-emergence treatments with dimethenamid were made available to the Meeting from Canada (4), France (2) and USA (14). In all trials, residues were below the limit of quantification in sweetcorn cobs (i.e. kernels plus cobs, without husks).

GAP in USA is for use as either a pre-plant, pre-emergence or post-emergence treatment (max 1.1 kg ai/ha, PHI 50 days). GAP in France and Germany is for pre-emergence use (max 1.0 kg ai/ha, PHI 60 days – France).

While there were no trials available that matched the USA pre-emergence GAP for dimethenamid-P, the Meeting agreed to use the results from 14 trials in USA involving dimethenamid with higher application rates (1.68 kg ai/ha) and with PHIs ranging from 70-98 days, since these all reflected residues in mature corn at harvest and reported residues of < 0.01 mg/kg.

Seven early post-emergence trials in USA involving dimethenamid, matching the USA PHI for dimethenamid-P (50 days), but at rates higher than the USA maximum rate for dimethenamid-P (1.1 kg ai/ha) also reported residues of < 0.01 (7) mg/kg.

The combined results from these pre- and post-emergence trials were < 0.01 (21).

The Meeting estimated an STMR value of 0 mg/kg and a maximum residue level of 0.01 mg/kg (*) for sweet corn (corn-on-the-cob). The HR was 0 mg/kg.

Beans, dry

Field trials involving single pre-plant, pre-emergence and post-emergence treatments with Dimethenamid were made available to the Meeting from Canada and USA. In all trials, residues in dry beans were below the limits of quantification (0.01 mg/kg in the USA trials and 0.02 mg/kg in the Canadian trials).

GAP in USA is for use as either a pre-plant, pre-emergence or early post-emergence treatment, up to 1.1 kg ai/ha, PHI 70 days.

While there were no dimethenamid-P trials available that matched the USA GAP for pre-plant or pre-emergence use, the Meeting agreed to use the results from 22 dimethenamid trials with higher application rates and with PHIs ranging from 76–133 days, since these all reflected residues in beans at harvest and reported residues were all below the limits of quantification. Results of these trials were: < 0.01 (14), < 0.02 (8) mg/kg.

While there were no dimethenamid-P trials available that matched the USA GAP for post-emergent use, the Meeting agreed to use the results from post-emergent dimethenamid trials with higher application rates and PHIs that matched the USA PHI (9 trials) as these were all below the limits of quantification. Reported residues in these trials were < 0.01 (9) mg/kg.

The combined results from these pre-plant, pre-emergence and post-emergence trials were < 0.01 (23), < 0.02 (8) mg/kg.

The Meeting estimated an STMR value of 0 mg/kg and a maximum residue level of 0.01 mg/kg (*) for beans, dry. The high residue was 0 mg/kg.

Soya bean, dry

Field trials involving single pre-plant, pre-emergence and post-emergence treatments with dimethenamid were made available to the Meeting from Canada and USA. In all trials, residues in dry beans were below the limit of quantification (0.01 mg/kg).

GAP in USA is for use as either a pre-plant, pre-emergence or post-emergence treatment, up to 1.1 kg ai/ha (applied from 1st to 3rd trifoliate leaf stage BBCH 12–14).

While there were no trials available that matched the USA GAPs for pre-plant or pre-emergence use, the Meeting agreed to use 18 pre-plant trials and 22 pre-emergence trials from Canada and USA involving dimethenamid at higher application rates of 1.68–3.0 kg ai/ha as these were all below the limits of quantification.

The combined results from these pre-plant and pre-emergence trials were < 0.01 (36), < 0.02 (4) mg/kg.

While there were no trials available that matched the USA GAP for post-emergence use, the Meeting agreed to use the results from 22 post-emergence dimethenamid trials with higher application rates, applied at the 2–4 leaf stage as these were all below the limits of quantification. Reported residues in these trials were < 0.01 (22) mg/kg.

The combined results from these pre-plant, pre-emergence and post-emergence trials were < 0.01 (58), < 0.02 (4) mg/kg.

The Meeting estimated an STMR value of 0 mg/kg and a maximum residue level of 0.01 mg/kg (*) for soya beans, dry. The high residue was 0 mg/kg.

Potato

Field trials involving single pre-plant, pre-emergence and post-emergence treatments with dimethenamid-P were made available to the Meeting from USA. In all trials, residues in tubers were below the limit of quantification (0.01 mg/kg).

GAP in USA is for use as a single pre-emergence treatment, up to 1.1 kg ai/ha with a PHI of 40 days.

One dimethenamid-P trial from USA matched the USA GAP (PHI 40 days) for the pre-emergence use, reporting a residue of < 0.01 mg/kg. Sixteen additional pre-emergence trials from USA, involving longer PHIs (62-128 days), reflecting commercial harvest intervals also reported residues of < 0.01 (16) mg/kg.

In addition, residues were all below the limit of quantification (0.01 mg/kg) in 17 pre-plant USA trials where treatments were made the same day as the above pre-emergence treatments (i.e. the day of planting) and in 34 post-emergence trials from the USA, where tubers were harvested 39–50 days after treatment. While not directly related to the USA GAP (pre-emergence use), the Meeting agreed that these results could be used as supporting data.

The combined results from these pre- and post-emergence trials were < 0.01 (68) mg/kg.

The Meeting estimated an STMR value of 0 mg/kg and a maximum residue level of 0.01 mg/kg (*) for potato. The HR was 0 mg/kg.

Sweet potato

The Meeting noted that GAP existed for dimethenamid-P in the USA. This GAP is the same as that established for potato, and the Meeting agreed that the available residue data for potato could be extrapolated to sweet potato.

The Meeting estimated an STMR value of 0 mg/kg and a maximum residue level of 0.01 mg/kg (*) for sweet potato. The high residue was 0 mg/kg.

Sugar beet

Field trials involving single post-emergent treatments with dimethenamid or dimethenamid-P were made available to the Meeting from France, Germany, Netherlands, Switzerland and USA. In all trials, residues in sugar beet roots were below the limit of quantification (0.01 mg/kg).

GAP in Germany is for a single post-emergent treatment (max 0.65 kg ai/ha), at the 6–8 leaf stage, GAP in Netherlands is for either a single post-emergent treatment (max 0.65 kg ai/ha) or 2–3 split post-emergence applications (max 0.65 kg ai/ha per season). In Belgium, GAP is also for either a single or split (3 applications) post-emergence treatments (max 0.72 kg ai/ha) up to the 8-leaf stage. GAP in USA is also for either a single or split (2 applications) post-emergence treatments (max 1.1 kg ai/ha per season, up to the 12-leaf stage - PHI 60 days).

Four trials in Germany, France and Netherlands, matching the single post-emergence application GAP of Belgium, Germany and Netherlands reported residues of < 0.01 (4) mg/kg and 12 USA post-emergence trials on sugar beet, matching the USA single-application GAP but with longer PHIs that reflect commercial harvest intervals (80–121 days) also reported residues below the limits of quantification. Combined residues in these trials were < 0.01 (16) mg/kg.

In addition, 5 single post-emergence dimethenamid trials from Germany, France and Switzerland with higher application rates but otherwise matching the Belgium GAP, reported residues of < 0.01 (5) and sixteen multiple-application dimethenamid trials in France, Germany and Switzerland, involving rates higher than the split-application Belgian GAP or with more than 3 treatments per season also reported residues of < 0.01 (16) mg/kg. The Meeting agreed to use the results from these post-emergence dimethenamid trials as residues were all below the limit of quantification and the combined results were < 0.01 (21) mg/kg.

The combined results from all the above post-emergence trials involving dimethenamid or dimethenamid-P were < 0.01 (37) mg/kg.

The Meeting estimated an STMR value of 0 mg/kg and a maximum residue level of 0.01 mg/kg (*) for sugar beet. The high residue was 0 mg/kg.

Beetroot

The Meeting noted that GAP existed for dimethenamid-P in beetroot in USA. This GAP is the same as that established for sugar beet, and the Meeting agreed that the available residue data for sugar beet could be extrapolated to beetroot.

The Meeting estimated an STMR value of 0 mg/kg and a maximum residue level of 0.01 mg/kg (*) for beet root. The high residue was 0 mg/kg.

Maize

Field trials involving single pre-plant, pre-emergence and post-emergence treatments with dimethenamid were made available to the Meeting from Belgium, Canada, France, Germany, Greece, Italy, Netherlands, Spain, Switzerland and USA. In all trials, residues in maize (grain) were below the limit of quantification (0.01 mg/kg).

GAP in USA is for use as a single pre-plant or pre-emergence treatment (max 1.1 kg ai/ha), or either a single or double (split-application) post-emergence treatment, with a maximum rate of 1.1 kg ai/ha per season (up to 30cm plant height). GAP in France is for pre-emergence use (max 1.1 kg ai/ha, PHI 90 days), in Germany, Netherlands and Spain GAP is for a single application, either pre-emergence or post-emergence (max 1.0 kg ai/ha) up to the 6-leaf stage, while the GAP in Belgium is for a post-emergence treatment (max 1.0 kg ai/ha) at the 3–4 leaf stage.

While there were no trials available that matched the GAP for pre-plant use in USA the Meeting agreed to use the results from the pre-plant dimethenamid trials (17) in USA and Canada with higher application rates (1.7–3.0 kg ai/ha), as these were all below the limits of quantification. Reported residues in these trials were < 0.01 (17) mg/kg.

While there were no trials available that matched the GAP for pre-emergence use in France, Germany, Netherlands, Spain and USA, the Meeting agreed to use the results of 11 dimethenamid pre-emergence trials from USA and 20 pre-emergence trials from Belgium, France, Germany, Greece, Italy and Netherlands, all involving higher rates than the respective GAPs in USA, Belgium and Italy, all reporting residues below the limit of quantification. Combined residues in these trials were < 0.01 (31) mg/kg.

Four post-emergence trials with dimethenamid-P in Germany, Italy and France, matching the GAP of Belgium, Germany, Netherlands and Spain reported residues of < 0.01 (4). The Meeting agreed to also use the results from 11 USA post-emergence dimethenamid trials involving higher rates but applied at the recommended USA GAP growth stage and 9 trials from Europe with higher application rates but applied at growth stages matching the GAP of Belgium, Germany or Spain as these were all below the limits of quantification. Reported residues in these trials were < 0.01 (20) mg/kg.

The combined results from all of the above pre-plant, pre-emergence and post-emergence trials with dimethenamid or dimethenamid-P were < 0.01 (72) mg/kg.

The Meeting estimated an STMR value of 0 mg/kg and a maximum residue level of 0.01 mg/kg (*) for maize. The high residue was 0 mg/kg.

Sorghum

Field trials involving single pre-emergence and post-emergence treatments with dimethenamid were made available to the Meeting from USA. In all trials, residues in sorghum grain were below the limit of quantification (0.01 mg/kg).

GAP in USA is for use as either a single pre-plant, pre-emergence or post-emergence treatment, or as split pre-plant/pre-emergence treatments, up to 1.1 kg ai/ha per season, PHI 80 days.

While there were no trials available that matched the USA GAP for pre-emergence use for dimethenamid-P, the Meeting agreed to use the results from pre-emergence dimethenamid trials (14) with higher application rates and longer PHIs (106–155 days), reflecting commercial harvest intervals, with the reported residues in these trials being < 0.01 (14) mg/kg.

While there were no trials available that matched the USA GAP for post-emergence use, the Meeting agreed to use the results from post-emergence dimethenamid trials with higher application rates that matched the USA GAP PHI (8 trials) but with higher application rates (1.68 kg ai/ha) as these were all below the limits of quantification. Reported residues in these trials were < 0.01 (8) mg/kg.

The combined results from the above pre-emergence and post-emergence trials with dimethenamid were < 0.01 (22) mg/kg.

The Meeting estimated an STMR value of 0 mg/kg and a maximum residue level of 0.01 mg/kg (*) for sorghum. The high residue was 0 mg/kg.

Peanut

Field trials involving single pre-emergence and post-emergence treatments with dimethenamid were made available to the Meeting from USA. In all trials, residues in peanut (nuts without shells) were below the limit of quantification (0.01 mg/kg).

GAP in the USA is for a single pre-plant, pre-emergence or post-emergence treatment, or as split pre-plant/pre-emergence treatments (max 1.1 kg ai/ha/season, PHI 80 days).

While there were no trials available that matched the USA GAP for pre-emergence use, the Meeting agreed to use the results from pre-emergence dimethenamid trials (14) with higher application rates and longer PHIs (121–145 days), reflecting commercial harvest intervals, with the reported residues in these trials being < 0.01 (14) mg/kg.

While there were no trials available that matched the USA GAP for post-emergence use, the Meeting agreed to use the results from 14 post-emergence dimethenamid trials with higher application rates that matched the USA GAP PHI, as these were all below the limits of quantification. Reported residues in these trials were < 0.01 (14) mg/kg.

The combined results from the above pre-emergence and post-emergence trials with dimethenamid were < 0.01 (28) mg/kg.

The Meeting estimated an STMR value of 0 mg/kg and a maximum residue level of 0.01 mg/kg (*) for peanut. The high residue was 0 mg/kg.

Animal Feed Commodities

Bean forage

Field trials involving single pre-plant, pre-emergence and post-emergence treatments with dimethenamid were made available to the Meeting from Canada and USA. Residues in bean forage were below the limits of quantification (0.01 mg/kg in the USA trials and 0.02 mg/kg in the Canadian trials) except in young plants (at the 6–8 leaf stage (BBCH16-18)) sampled 12–18 days after a late post-emergence treatment.

GAP in USA is for use as either a pre-plant, pre-emergence or post-emergence treatment (max 1.1 kg ai/ha). The PHI for beans is 70 days, with post-emergence use being from 1st to 3rd trifoliate leaf stage BBCH 13–14 Crop stage.

While there were no trials available that matched the USA GAP for pre-plant or pre-emergence use, the Meeting agreed to use the results from 5 pre-plant and 17 pre-emergence dimethenamid trials from Canada and USA with higher application rates (1.3–2.7 kg ai/ha) since the reported residues were all below the limits of quantification. Reported residues in these trials were < 0.01 (14), < 0.02 (8) mg/kg.

There were no trials available that matched the USA GAP for post-emergence use, and the Meeting agreed to use the results from 14 USA trials involving dimethenamid with higher application rates (1.68 kg ai/ha) as residues in mature bean forage (i.e. just before senescence) all reported residues below the limit of quantification. Residues in these trials were < 0.01 (14).

The combined results from these pre-plant, pre-emergence and post-emergence trials were < 0.01 (28), < 0.02 (8) mg/kg.

The Meeting estimated a median residue of 0 mg/kg and a high residue of 0 mg/kg for bean forage.

Bean fodder

Field trials involving single pre-plant, pre-emergence and post-emergence treatments with dimethenamid were made available to the Meeting from Canada and USA. Residues in bean fodder were below the limits of quantification (0.01 mg/kg in the USA trials and 0.02 mg/kg in the Canadian trials)

GAP in USA is for use as either a pre-plant, pre-emergence or post-emergence treatment, up to 1.1 kg ai/ha. The PHI for beans is 70 days, with post-emergence use being from 1st to 3rd trifoliate leaf stage.

While there were no trials available that matched the USA GAP for pre-plant or pre-emergence use, the Meeting agreed to use the results from 22 dimethenamid trials with higher application rates and with PHIs ranging from 76-133 days, since these all reflected residues in bean fodder at harvest and reported residues were all below the limits of quantification. Results of these trials were: < 0.01 (14), < 0.02 (8) mg/kg.

While there were no trials available that matched the USA GAP for post-emergence use, the Meeting agreed to use the results from post-emergence dimethenamid trials with higher application rates and PHIs that matched the USA GAP (14 trials) as these were all below the limits of quantification. Reported residues in these trials were < 0.01 (14) mg/kg.

The combined results from these pre-plant, pre-emergence and post-emergence trials were < 0.01 (28), < 0.02 (8) mg/kg.

The Meeting estimated a median residue of 0 mg/kg and a maximum residue level of 0.01 (*) mg/kg for bean fodder. The highest residue was 0 mg/kg.

Peanut forage

Field trials involving single pre-emergence and post-emergence treatments with dimethenamid were made available to the Meeting from USA. In all trials, residues in peanut forage were below the limit of quantification (0.01 mg/kg).

GAP in USA is for use as either a single pre-plant, pre-emergence or post-emergence treatment, or as split pre-plant/pre-emergence treatments, up to 1.1 kg ai/ha per season, PHI 80 days (hay or straw).

While there were no trials available that matched the USA GAP for pre-emergence use, the Meeting agreed to use the results from pre-emergence dimethenamid trials (14) with higher application rates and longer PHIs (121–145 days), reflecting commercial harvest intervals, with the reported residues in these trials being < 0.01 (14) mg/kg.

While there were no trials available that matched the USA GAP for post-emergence use, the Meeting agreed to use the results from 14 post-emergence dimethenamid trials with higher application rates that matched the USA GAP PHI, as these were all below the limits of quantification. Reported residues in these trials were < 0.01 (14) mg/kg.

The combined results from the pre-emergence and post-emergence trials with dimethenamid were < 0.01 (28) mg/kg.

The Meeting estimated a median residue of 0 mg/kg and a highest residue of 0 mg/kg for peanut forage.

Peanut fodder

Field trials involving single pre-emergence and post-emergence treatments with dimethenamid were made available to the Meeting from USA. In all trials, residues in peanut fodder were below the limit of quantification (0.01 mg/kg).

GAP in USA is for use as either a single pre-plant, pre-emergence or post-emergence treatment, or as split pre-plant/pre-emergence treatments, up to 1.1 kg ai/ha per season, PHI 80 days (hay or straw).

While there were no trials available that matched the USA GAP for pre-emergence use, the Meeting agreed to use the results from pre-emergence dimethenamid trials (14) with higher application rates and longer PHIs (121–145 days), reflecting commercial harvest intervals, with the reported residues in these trials being < 0.01 (14) mg/kg.

While there were no trials available that matched the USA GAP for post-emergence use, the Meeting agreed to use the results from 14 post-emergence dimethenamid trials with higher application rates that matched the USA GAP PHI, as these were all below the limits of quantification. Reported residues in these trials were < 0.01 (14) mg/kg.

The combined results from the pre-emergence and post-emergence trials with dimethenamid were < 0.01 (28) mg/kg.

The Meeting estimated an STMR value of 0 mg/kg and a maximum residue level of 0.01 mg/kg (*) for peanut fodder. The highest residue was 0 mg/kg.

Soya bean forage and fodder

Field trials involving single pre-plant, pre-emergence and post-emergence treatments with dimethenamid were made available to the Meeting from Canada and USA. GAP in USA is for use as either a pre-plant, pre-emergence or post-emergence treatment, up to 1.1 kg ai/ha but with a restriction that treated soya bean forage, hay or straw must not be fed to livestock.

The Meeting agreed not to estimate STMRs, maximum residue levels or highest residues for soya bean forage (green) or soya bean fodder.

Fodder beet

The Meeting noted that GAP existed for use on fodder beet in Belgium and Netherlands. These GAPs were the same as those established for sugar beet, and the Meeting agreed that the available residue data for sugar beet could be extrapolated to fodder beet.

The Meeting estimated an STMR value of 0 mg/kg and a maximum residue level of 0.01 mg/kg (*) for fodder beet. The highest residue was 0 mg/kg.

Hay or fodder (dry) of grasses

Field trials on perennial grass seed crops, involving single post-emergence treatments with dimethenamid-P were made available to the Meeting from USA. GAP in USA is for use as post-emergence treatment, up to 1.1 kg ai/ha but with a restriction that livestock must not be grazed on treated areas and that treated grasses, forage, hay, silage, straw, seed or seed screenings must not be fed to livestock.

The Meeting agreed not to estimate STMRs, maximum residue levels or highest residues for hay or fodder (dry) of grasses.

Maize forage

Field trials involving single pre-plant, pre-emergence and post-emergence treatments with dimethenamid (number) and dimethenamid-P (6) were made available to the Meeting from Belgium, Canada, France, Germany, Greece, Italy, Netherlands, Spain, Switzerland and USA. Residues in maize forage were below the limit of quantification (0.01 mg/kg) in all pre-plant and pre-emergence trials. Residues were detected in some post-emergence trials, ranging from 0.01 mg/kg to 0.04 mg/kg in samples taken 21–43 days after treatment.

GAP in USA is for use as a single pre-plant or pre-emergence treatment (max 1.1 kg ai/ha), or either a single or 2 split-applications post-emergence, with a maximum rate of 1.1 kg ai/ha per season, PHI 40 days. GAP in Germany, Netherlands and Spain is for a single application, either pre-emergence or post-emergence (max 1.0 kg ai/ha) while GAP in Belgium is for a post-emergence treatment, up to 1.0 kg ai/ha and GAP in France is for a pre-emergence use (max 1.1 kg ai/ha, PHI 90 days).

While there were no trials available that matched the USA GAPs for pre-plant and pre-emergence uses, the Meeting agreed to use the results from the pre-plant and pre-emergence dimethenamid trials with higher application rates, as these were all below the limits of quantification.

Trials with dimethenamid from Canada (6) and USA (11), involving higher pre-plant application rates of 1.68-3.0 kg ai/ha and longer PHIs (56–70 days) that reflected commercial forage intervals, reported residues of < 0.01 (17) mg/kg.

Sixteen pre-emergence trials from USA and Canada, involving dimethenamid application rates higher than the USA GAP and with longer PHIs (56-69 days) that reflected commercial forage harvest intervals reported residues of < 0.01 (16). Dimethenamid pre-emergence trials (14) in France, Italy, Spain and Switzerland using rates higher than the GAP of Germany, Netherlands, France and Spain and with PHIs that reflected commercial forage harvest intervals (of about 60–90 days), reported residues of < 0.01 (14) mg/kg.

Six post-emergence trials involving dimethenamid-P in Germany, Italy and France, matching the GAP of Belgium, Germany, Netherlands and Spain, with PHIs of 21-47 days, reported residues of < 0.01 (3), 0.02, 0.03 and 0.04 mg/kg.

The Meeting agreed to combined results from these pre-plant and pre-emergence trials with dimethenamid and the post-emergence trials with dimethenamid-P to give a residue data set of < 0.01 (50), 0.02, 0.03 and 0.04 mg/kg.

Based on a dry matter content of 40% the Meeting estimated a median residue of 0.025 mg/kg and a highest residue of 0.1 mg/kg for maize forage.

Maize fodder

Field trials involving single pre-plant, pre-emergence and post-emergence treatments with dimethenamid and dimethenamid-P (6) were made available to the Meeting from Belgium, Canada, France, Germany, Greece, Italy, Netherlands, Spain, Switzerland and USA. Residues in maize fodder were below the limit of quantification (0.01 mg/kg) in all trials except one residue of 0.01 mg/kg in fodder treated with dimethenamid, 118 days after a post-emergence treatment (1.43 kg ai/ha) in Belgium.

GAP in USA is for use as a single pre-plant or pre-emergence treatment (max 1.1 kg ai/ha), or either a single or 2 split-applications post-emergence, with a maximum rate of 1.1 kg ai/ha per season, PHI 40 days. GAP in Germany, Netherlands and Spain is for a single application, either pre-emergence or post-emergence (max 1.0 kg ai/ha) while the GAP in Belgium is for a post-emergence

treatment, up to 1.0 kg ai/ha and GAP in France is for a pre-emergence use (max 1.1 kg ai/ha, PHI 90 days).

While there were no trials available that matched the GAP for pre-plant use in USA, the Meeting agreed to use the results from the pre-plant dimethenamid trials (17) in USA and Canada with higher application rates (1.7–3.0 kg ai/ha), as these were all below the limits of quantification. Reported residues in these trials were < 0.01 (17) mg/kg.

While there were no trials available that matched the GAP for pre-emergence use in France, Germany, Netherlands, Spain and in USA, the Meeting agreed to use the results of 17 dimethenamid pre-emergence trials from USA and Canada and 8 trials from France, Germany and Switzerland, all involving higher rates than the respective GAPs in USA, Belgium and Italy and all below the limit of quantification. Reported residues in these trials were < 0.01 (25) mg/kg.

Six post-emergence trials in Belgium, Germany, Italy, Netherlands and France, matching the GAPs of Belgium, Germany, Netherlands and Spain, with PHIs of 78–114 days, reported residues of < 0.01 (6).

The Meeting agreed to combine results from these pre-plant and pre-emergence trials with dimethenamid and the post-emergence trials with dimethenamid-P to give a residue data set of < 0.01 (48) mg/kg.

The Meeting estimated an STMR value of 0 mg/kg and a maximum residue level of 0.01mg/kg (*) for maize fodder. The highest residue was 0 mg/kg.

Sorghum forage (green)

Field trials involving single pre-emergence and post-emergence treatments with dimethenamid were made available to the Meeting from USA. In all trials, residues in sorghum forage were below the limit of quantification (0.01 mg/kg).

GAP in USA is for use as either a single pre-plant, pre-emergence or post-emergence treatment, or as split pre-plant/pre-emergence treatments, up to 1.1 kg ai/ha per season, PHI 60 days.

While there were no trials available that matched the USA GAP for pre-emergence use, the Meeting agreed to use the results from pre-emergence dimethenamid trials (14) with higher application rates and longer PHIs (59–107 days), reflecting commercial harvest intervals, with the reported residues in these trials being < 0.01 (14) mg/kg.

While there were no trials available that matched the USA GAP for post-emergence use, the Meeting agreed to use the results from 11 post-emergence dimethenamid trials with higher application rates that matched the USA PHI (60 days), as these were all below the limits of quantification. Reported residues in these trials were < 0.01 (11) mg/kg.

The combined results from these pre-emergence and post-emergence trials with dimethenamid were < 0.01 (25) mg/kg.

The Meeting estimated a median residue of 0 mg/kg and a highest residue of 0 mg/kg for sorghum forage.

Sorghum straw and fodder, dry

Field trials involving single pre-emergence and post-emergence treatments with dimethenamid were made available to the Meeting from USA. In all trials, residues in sorghum fodder were below the limit of quantification (0.01 mg/kg).

GAP in USA is for use as either a single pre-plant, pre-emergence or post-emergence treatment, or as split pre-plant/pre-emergence treatments, up to 1.1 kg ai/ha per season, PHI 80 days.

While there were no trials available that matched the USA GAP for pre-emergence use, the Meeting agreed to use the results from pre-emergence dimethenamid trials (14) with higher application rates and longer PHIs (106–155 days), reflecting commercial harvest intervals, with the reported residues in these trials being < 0.01 (14) mg/kg.

While there were no trials available that matched the USA GAP for post-emergence use, the Meeting agreed to use the results from post-emergence dimethenamid trials with higher application rates that matched the USA GAP PHI as these were all below the limits of quantification. Reported residues in these trials were < 0.01 (8) mg/kg.

The combined results from these pre-emergence and post-emergence trials with dimethenamid were < 0.01 (22) mg/kg.

The Meeting estimated an STMR value of 0 mg/kg and a maximum residue level of 0.01 mg/kg (*) for sorghum fodder. The highest residue was 0 mg/kg.

Sugar beet leaves or tops

Sugar beet field trials involving single post-emergence treatments with dimethenamid or dimethenamid-P were made available to the Meeting from France, Germany, Netherlands, Switzerland and USA. In all trials, residues in sugar beet leaves or tops were below the limit of quantification (0.01 mg/kg) within 30 days after treatment.

GAP in Germany is for a single post-emergence treatment (max 0.65 kg ai/ha) at the 6–8 leaf stage (BBCH 16–18), GAP in Netherlands is for either a single post-emergence treatment (max 0.65 kg ai/ha) or 2–3 split post-emergence applications (max 0.65 kg ai/ha per season). In Belgium, GAP is also for either a single or split (3 applications) post-emergence treatments (max 0.72 kg ai/ha) up to the 8-leaf stage (BBCH 18). GAP in USA is also for either a single or split (2 applications) post-emergence treatments (max 1.1 kg ai/ha per season) up to the 12-leaf stage – PHI 60 days).

Four trials in Germany, France and Netherlands, matching the single post-emergence application GAP of Belgium, Germany and Netherlands reported residues of < 0.01 mg/kg and 12 USA post-emergence trials on sugar beet, matching the USA single-application GAP but with longer PHIs that reflect commercial harvest intervals (80–121 days) also reported residues below the limits of quantification. Combined residues in these trials were < 0.01 (16) mg/kg. In addition, six single-application dimethenamid trials from Germany, France and Switzerland with higher application rates but otherwise matching Belgian GAP, reported residues of < 0.01 (6) mg/kg.

Sixteen multiple-treatment post-emergence dimethenamid trials in France, Germany and Switzerland, involving rates higher than the split-application Belgian GAP or with more than 3 treatments per season also reported residues of < 0.01 mg/kg.

The Meeting agreed to use the results from these single and split-application post-emergence dimethenamid trials as residues were all below the limit of quantification and the combined results were < 0.01 (22) mg/kg.

The combined results from these single or split-application post-emergence trials with dimethenamid-P or dimethenamid were < 0.01 (38) mg/kg.

The Meeting estimated a median residue of 0 mg/kg and a highest residue of 0 mg/kg for sugar beet leaves or tops.

Fodder beet leaves or tops

The Meeting noted that GAP existed in Belgium and Netherlands for fodder beet at the same GAPs established for sugar beet, and agreed that the available residue data for sugar beet could be extrapolated to fodder beet.

The Meeting estimated a median residue of 0 mg/kg and a highest residue of 0 mg/kg for fodder beet leaves or tops.

Fate of residues in storage and during processing

The effect of processing on the level of residues of dimethenamid-P in potatoes and of dimethenamid in soya beans and maize were reported to the Meeting.

Potatoes from a USA field trial where dimethenamid-P was applied twice at an exaggerated (5×) rate of 3.5 kg ai/ha, pre-emergence and post-emergence (PHI 40 days), were processed into chips and flakes using procedures that reflected commercial practice. Dimethenamid residues were not found (LOQ 0.01 mg/kg) in either the initial tubers or in any of the processing fractions (wet peel, chips and flakes).

Soya beans from two US field trials where dimethenamid was applied pre-emergence at an exaggerated (5×) rate of 8.4 kg ai/ha were processed into oil using procedures that reflected commercial practice. Dimethenamid residues were not found (LOQ 0.01 mg/kg) in either the unprocessed beans or in any of the processing fractions (including hulls, meal, soap stock, crude lecithin, crude oil and refined oil).

Maize from two USA field trials where dimethenamid was applied as either pre-plant or pre-emergence treatments at an exaggerated (5×) rate of 8.4 kg ai/ha was processed into flour, meal and oil using both dry and wet procedures that reflected commercial practice. Dimethenamid residues were not found (LOQ 0.01 mg/kg) in either the unprocessed grain or in any processing fractions (including dust, grits, meal, flour, press cake, soap stock, crude oil and refined oil).

Farm animal dietary burden

The Meeting estimated the dietary burden of dimethenamid-P residues in cattle and poultry on the basis of the diets listed in Appendix IX of the *FAO Manual* (FAO, 2002). Calculations from highest residues provide the levels in feed suitable for estimating animal commodity MRLs, while calculations from STMR or median residue values for feed are suitable for estimating STMRs.

Detectable residues were only reported in maize forage (median residue level of 0.01 mg/kg dry matter, highest residue level 0.1 mg/kg dry matter) and residues were below the limit of quantification (0.01 mg/kg) in all other animal feed commodities considered by the Meeting (STMRs or median residue levels of 0 mg/kg and highest residues of 0 mg/kg).

Table 99. Estimated maximum dietary burden of farm animals.

						Diet content (%)			Residue contribution, mg/kg		
Commodity	Group	Residue (mg/kg)	Basis	% DM	Residue ÷ DM	*Beef cattle*	*Dairy cows*	*Poultry*	Beef cattle	Dairy cows	Poultry
Maize forage	AF	0.04	Highest	40	0.1	*40*	*50*	-	0.04	0.05	-
TOTAL						*40*	*50*	*0*	**0.04**	**0.05**	**0**

Table 100. Estimated median dietary burden of farm animals.

Commodity	Group	Residue (mg/kg)	Basis	% DM	Residue ÷ DM	*Diet content (%)*			Residue contribution, mg/kg		
						Beef cattle	*Dairy cows*	*Poultry*	Beef cattle	Dairy cows	Poultry
Maize forage	AF	0.01	Median	40	0.025	*40*	*50*	-	0.01	0.013	-
TOTAL						*40*	*50*	*0*	**0.01**	**0.013**	**0**

The total dietary burdens for animal commodity MRL estimation (residue levels in animal feeds expressed on dry weight) are 0.04 ppm for beef cattle, 0.05 ppm for dairy cattle, and 0 ppm for poultry. The associated median dietary burden for STMR estimation are 0.01 ppm (beef cattle), 0.013 ppm (dairy cattle) and 0 ppm (poultry).

Animal commodity maximum residue levels

The Meeting noted that in the goat metabolism study, no residues of dimethenamid were found in milk, muscle, fat, liver or kidney of goats dosed for four days with the equivalent of 223 ppm dimethenamid in the diet. As this dosing level is more than 4000 times higher than the maximum estimated dietary burden (0.05 ppm) arising from the uses of dimethenamid-P, the Meeting agreed that residues would not be expected in livestock and estimated STMRs and HRs of 0 mg/kg for meat (from mammals other than marine mammals), edible offal, mammalian and milks.

The Meeting estimated maximum residue levels of 0.01 (*) mg/kg for meat (from mammals other than marine mammals); 0.01 (*) mg/kg for edible offal, mammalian and 0.01 (*) mg/kg for milks.

For poultry, the estimated dietary burden is 0 ppm and the Meeting estimated STMRs and HRs of 0 mg/kg for poultry meat, poultry, edible offal and eggs.

The Meeting estimated maximum residue levels of 0.01 (*) mg/kg for poultry meat; 0.01 (*) mg/kg for poultry edible offal of, and 0.01 (*) mg/kg for eggs.

RECOMMENDATIONS

On the basis of the data from supervised trials the Meeting concluded that the residue levels listed below are suitable for establishing maximum residue levels and for IEDI assessment.

Definition of the residue (for compliance with MRL and for estimation of dietary intake): *dimethenamid-P and its enantiomer*. This definition applies to both plant and animal commodities. The residue definition could apply to residues arising from the use of either dimethenamid-P or dimethenamid.

Table 101. Summary of recommendations.

CCN	Commodity Name	Recommended MRL (mg/kg)	STMR or STMR-P (mg/kg)	HR or HR-P (mg/kg)
AL 061	Bean fodder	0.01 (*)		
VD 071	Beans, dry	0.01 (*)	0	
VR 574	Beetroot	0.01 (*)	0	0
PE 112	Eggs	0.01 (*)	0	0
AM 1051	Fodder beet	0.01 (*)		
VA 381	Garlic	0.01 (*)	0	0

CCN	Commodity Name	Recommended MRL (mg/kg)	STMR or STMR-P (mg/kg)	HR or HR-P (mg/kg)
GC 647	Maize	0.01 (*)	0	
AS 645	Maize fodder	0.01 (*)		
MM 095	Meat (from mammals other than marine mammals)	0.01 (*)	0 muscle 0 fat	0 muscle 0 fat
ML 106	Milks	0.01 (*)	0	0
VA 385	Onion, Bulb	0.01 (*)	0	0
SO 697	Peanut	0.01 (*)	0	
AL 697	Peanut fodder	0.01 (*)		
VR 589	Potato	0.01 (*)	0	0
PM 110	Poultry meat	0.01 (*)	0 muscle 0 fat	0 muscle 0 fat
PO 111	Poultry, Edible offal of	0.01 (*)	0	0
VA 388	Shallot	0.01 (*)	0	0
GC 651	Sorghum	0.01 (*)	0	
AS 651	Sorghum straw and fodder, Dry	0.01 (*)		
VD 541	Soya bean, dry	0.01 (*)	0	
VR 596	Sugar beet	0.01 (*)	0	
VO 447	Sweet corn (corn-on-the-cob)	0.01 (*)	0	0
VR 508	Sweet potato	0.01 (*)	0	0

(*) = the MRL is estimated at or about the LOQ

DIETARY RISK ASSESSMENT

The evaluation of dimethenamid-P has resulted in recommendations for MRLs at the limit of quantification with STMRs and HRs of 0 mg/kg for raw and processed commodities. The Meeting concluded that the long-term and short-term intake of residues of dimethenamid-P from uses that have been considered by the JMPR do not present a public health concern. The results are shown in Annex 3 and 4 of the 2005 JMPR Report.

REFERENCES

Arsenovic, M., 2003. Dimethenamid-P: Magnitude of S-dimethenamid residues on green onion Interregional Project Number 4. Interregional Project Number 4, Rutgers University, North Brunswick, USA. Unpublished

Atallah, Y.H., Moore, P.A and Bade, T.R., 1991. Uptake, translocation and metabolism of the herbicide SAN-582H in soybean. Sandoz Agro Inc., Illinois, USA. Unpublished

Bade, T.R. 1990., Residues of SAN-582H and it's oxalamide metabolite in corn wet and dry processing fractions. Sandoz Agro Inc., Illinois, USA. Unpublished

Bade, T.R. 1991. Confirmatory method trial of the residue method "A method for the determination of residues of SAN-582H in corn and soil samples". Sandoz Agro Inc., Illinois, USA. Unpublished

Bade, T.R. 1992. Stability of SAN-582H and its metabolites in stored frozen corn samples - QAU #90/05/16. Sandoz Agro Inc., Illinois, USA. Unpublished

Bourry, R. and Hertl, P. 1991a., A method for the determination of the residues of SAN 582 H in corn and soil samples. Sandoz Agro Ltd., Basle, Switzerland. Unpublished

Bourry, R. and Hertl, P. 1991b, A method for the determination of the residues of SAN 582 H in corn and soil samples. Sandoz Agro Ltd., Basle, Switzerland. Unpublished

Bourry, R. and Hertl, P. 1992, A method for the determination of dimethenamid (SAN 582 H) in animal tissues (muscle, fat, kidney, liver), eggs and milk. Sandoz Agro Ltd., Basle, Switzerland. Unpublished

Bourry, R., Hertl, P. and Karapally, J.C. 1993., A method for the determination of the residues of SAN 582 H in corn and soil samples. Method #AM-0884-0193-1. Sandoz Agro Inc., Illinois, USA. Unpublished

Chen, H., 1997a, Boiling point of SAN 1289 H, technical. Sandoz Agro Inc., Illinois, USA. Unpublished

Chen, H. 1997b, Physical state of SAN 1289 H, technical. Sandoz Agro Inc., Illinois, USA. Unpublished

Chen, H. and Laster, W. 1996. Vapor pressure of SAN 1289 H. Sandoz Agro Inc., Illinois, USA. Unpublished

Corley, J. 1999. Dimethenamid: magnitude of S-Dimethenamid residues on onion (dry bulb) Interregional Project Number 4. Interregional Project Number 4, Rutgers University, North Brunswick, USA. Unpublished

Dorn, C. and Fricker, P. 1996., Determination of Dimethenamid residues in sugar beet (Beta vulgaris) matrices after application of Frontier or of a tank-mixture of Frontier, Tramat and Betanal, in France, 1995 (DC, RAH). Sandoz Agro Ltd.; Basle; Switzerland Unpublished

Fegert, A. and Mackenroth, Ch. 1999., Validation of BASF method 980/0: Determination of dimethenamid in sugar beet and maize matrices using GC/MS determination. BASF AG., Limburgerhof, Germany Fed.Rep. Unpublished

Formanski, L.J. 1993., Analysis of soybean forage, grain, hay, and straw for residues of SAN-582H (1992 Season). Sandoz Agro Inc., Illinois, USA. Unpublished

Fricker, P. and Hertl, P. 1994., Determination of residues of dimethenamid in corn (Zea mais) after application with SAN 582 H 900 EC under field conditions in Germany, 1993 (degradation curve). Sandoz Agro Ltd., Basle, Switzerland. Unpublished

Fuchs, A. et al. 1998., Determination of dimethenamid residues in sugar beet matrices after application of Frontier under field conditions in Germany and Switzerland, 1996. BASF AG., Limburgerhof, Germany Fed.Rep. Unpublished

Greenhalgh, R. 1995a. Magnitude of dimethenamid residues in white beans grown in Ontario, Canada. Sandoz Agro Canada Inc., Ontario, Canada. Unpublished

Greenhalgh, R. 1995b., Magnitude of dimethenamid residues in sweet corn grown in Ontario, Canada. Sandoz Agro Canada Inc., Ontario, Canada. Unpublished

Guirguis, A.S and Yu, C.C. 1992a., SAN 582 H: Addendum to previous goat metabolism studies. Sandoz Agro Inc., Illinois, USA. Unpublished

Guirguis, A.S and Yu, C.C. 1992b, SAN 582 H: Determination of the presence of sulfonate metabolite in goat excreta. Sandoz Agro Inc., Illinois, USA. Unpublished

Guirguis, A.S. 1997., Hydrolysis of S-dimethenamid. Sandoz Agro Inc., Illinois, USA. Unpublished

Guirguis, A.S. 1997a., S-dimethenamid: Photodegradation study in an aqueous solution. Sandoz Agro Inc., Illinois, USA. Unpublished

Guirguis, M. and Wofford, J.T. 1999., Magnitude of S-dimethenamid residues in potatoes. BASF Corporation, NC, USA. Unpublished

Haughey, D. 2004., The Magnitude of S-dimethenamid residues in sugar beets. BASF Corporation, NC, USA. Unpublished

Haughey, D., Guirguis, M. and Riley, M. 1999., The magnitude of S-dimethenamid residues in sugar beet processed fractions. BASF Corporation, NC, USA. Unpublished

Hertl, P. 1991g., Residues of SAN 582 H in corn taken at different time intervals following treatment with SAN 582 H 900 EC in France, 1990 (degradation curve). Sandoz Agro Ltd., Basle, Switzerland. Unpublished

Hertl, P. 1991h., Residues of SAN 582 H in corn (grain) taken at different time intervals following treatment with SAN 582 H 900 EC in France, 1990 (degradation curve). Sandoz Agro Ltd., Basle, Switzerland. Unpublished

Hertl, P. 1991a., Residues of SAN 582 H in corn (Zea mais) taken at different time intervals following treatment with SAN 582 H 900 EC in Italy, 1990 (degradation curve). Sandoz Agro Ltd., Basle, Switzerland. Unpublished

Hertl, P. 1991b., Residues of SAN 582 H in corn (Zea mais) taken at different time intervals following treatment with SAN 582 H 900 EC in Italy, 1990 (degradation curve). Sandoz Agro Ltd., Basle, Switzerland. Unpublished

Hertl, P. 1991c., Residues of SAN 582 H in corn (Zea mais) taken at different time intervals following treatment with SAN 582 H 900 EC in Italy, 1990 (degradation curve). Sandoz Agro Ltd., Basle, Switzerland. Unpublished

Hertl, P. 1991d., Residues of SAN 582 H in corn (Zea mais) taken at different time intervals following treatment with SAN 582 H 900 EC in Italy, 1990 (degradation curve). Sandoz Agro Ltd., Basle, Switzerland. Unpublished

Hertl, P. 1991i., Residues of SAN 582 H in corn (grain) following treatment with SAN 582 H 900 EC in France, 1990 (residues at harvest). Sandoz Agro Ltd., Basle, Switzerland. Unpublished

Hertl, P., 1991e., Residues of SAN 582 H in corn (grain) following treatment with SAN 582 H 900 EC in France, 1990 (residues at harvest). Sandoz Agro Ltd., Basle, Switzerland. Unpublished

Hertl, P. 1991j., Residues of SAN 582 H in corn (grain) taken at different time intervals following treatment with SAN 582 H 900 EC in France, 1990 (degradation curve). Sandoz Agro Ltd., Basle, Switzerland. Unpublished

Hertl, P. 1991f., Residues of SAN 582 H in corn (grain) following treatment with SAN 582 H 900 EC in France, 1980 (residues at harvest). Sandoz Agro Ltd., Basle, Switzerland. Unpublished

Hertl, P. and Fricker, P. 1995., Determination of residues of dimethenamid in corn taken at different time intervals after the application with SAN 582 H 900 EC under field conditions in Germany 1991 (degradation curve). Sandoz Huningue S.A., Huningue, France Unpublished

Hertl, P. and Vogler, F. 1994., Determination of residues of dimethenamid in corn taken at different time intervals after the application with SAN 582 H 900 EC under field conditions in Switzerland 1991 (degradation curve). Sandoz Agro Ltd.; Basle; Switzerland Unpublished

Hsieh, T. 1999., Henry's law constant of dimethenamid-P. BASF Corporation, NC, USA. Unpublished

Jimenez, N.C. 1990a., Analysis of corn samples for SAN-582H and its oxalamide metabolite (1988 Season). Sandoz Agro Inc., Illinois, USA. Unpublished

Jimenez, N.C. 1990b., Analysis of corn samples for SAN-582H and its oxalamide metabolite. Sandoz Agro Inc., Illinois, USA. Unpublished

Jimenez, N.C. 1991a., Analysis of soybean samples for SAN-582H and its oxalamide and sulfonate metabolites (1990 Season). Sandoz Agro Inc., Illinois, USA. Unpublished

Jimenez, N.C. 1991b., Residues of SAN-582H and It’s oxalamide metabolite in soybean processing fractions. Sandoz Agro Inc., Illinois, USA. Unpublished

Jimenez, N.C. 1991c., Analysis of soybean samples for SAN-582H and its oxalamide and sulfonate metabolites (1989 Season). Sandoz Agro Inc., Illinois, USA. Unpublished

Jimenez, N.C. 1992a., Magnitude of residue of SAN-582H in corn grain and corn processed fractions. Sandoz Agro Inc., Illinois, USA. Unpublished

Jimenez, N.C. 1992b., Analysis of corn samples from the 1991 season for SAN-582H residue. Sandoz Agro Inc., Illinois, USA. Unpublished

Jimenez, N.C. 1992c., Reanalysis of corn samples from the 1989 season for SAN-582H residue. Sandoz Agro Inc., Illinois, USA. Unpublished

Jimenez, N.C. 1992d., Analysis of corn samples from the 1990 season for SAN-582H residue. Sandoz Agro Inc., Illinois, USA. Unpublished

Jimenez, N.C. 1992e., Crop residue study with SAN-582H on soybeans (1991 season). Sandoz Agro Inc., Illinois, USA. Unpublished

Jimenez, N.C. 1992f., Reanalysis of soybean samples from the 1990 season crop residue study with SNA-582H. Sandoz Agro Inc., Illinois, USA. Unpublished

Jimenez, N.C. 1992g., Magnitude of the residue of SAN-582H in soybean grain and soybean processing fractions. Sandoz Agro Inc., Illinois, USA. Unpublished

Jimenez, N.C. 1992h., Crop residue study with SAN-582H on soybeans (1991 season) - Addendum. Sandoz Agro Inc., Illinois, USA. Unpublished

Jones, R. 1997., Determination of odor of technical SAN 1289 H. BASF Corporation, NC, USA. Unpublished

Kaethner, M. 1993., Determination of residues of dimethenamid at various timings in maize (Zea mais) after application with SAN 582 H 900 EC under field conditions in Spain, 1992. Sandoz Agro Ltd.; Basle; Switzerland Unpublished

Kaethner, M. 1995., Determination of residues of dimethenamid after one application to sweet corn in France, 1992 (residue at harvest). Sandoz Agro Ltd.; Basle; Switzerland Unpublished

KröhL, T. 1999., Physical properties of dimethenamid-P (PAI). BASF AG., Limburgerhof, Germany Fed.Rep. Unpublished

Laban, S.L. 1994., Crop residue study with SAN-582H on soybeans coarse, medium and fine soils. Sandoz Agro Inc., Illinois, USA. Unpublished

Laban, S.L. 1995a., Crop residue study with SAN-582H on dry beans. Sandoz Agro Inc., Illinois, USA. Unpublished

Laban, S.L. 1995b., Crop residue study with SAN-582H on sweet corn. Sandoz Agro Inc., Illinois, USA. Unpublished

Laban, S.L. 1995c., Crop residue study with SAN-582H on grain sorghum. Sandoz Agro Inc., Illinois, USA. Unpublished

Laban, S.L. 1996., Determination of the stability of SAN-582H in soybean process fractions. Sandoz Agro Inc., Illinois, USA. Unpublished

Lam, W.W. 1998., Determination of the n-octanol/water partition coefficient of dimethenamid-P. BASF Corporation, NC, USA. Unpublished

Lam, W.W. 1996., [3-14C-Thienyl]dimethenamid: Metabolism in sugar beet (Beta vulgaris L.) Amended final report. Sandoz Agro Inc., Illinois, USA. Unpublished

Laster, W. 1996., Solubility of SAN 1289 H in water. Sandoz Agro Inc., Illinois, USA. Unpublished

Liu, J. 1997., Solubility of technical SAN 1289 H in solvents. Sandoz Agro Inc., Illinois, USA. Unpublished

McCurvin, D. and Stasiak, M. 1992., Analysis of Ontario corn samples from the 1992 growing season for SAN-582H. Sandoz Agro Canada Inc., Ontario, Canada. Unpublished

Meumann, H., Benz, A and Mackenroth, Ch. 1999., Study on the residue behaviour of dimethenamid in sugar beet after application with BAS 656 02 H and BAS 656 07 H under field conditions in Germany, France and the Netherlands, 1998. BASF AG., Limburgerhof, Germany Fed.Rep. Unpublished

Moore, P.A. and Wendt, D.R. 1995., Corn (Zea mais) metabolism of 14C-(3-thienyl)-dimethenamid. Sandoz Agro Inc., Illinois, USA. Unpublished

Perny, A. 1997a.,Determination of residues of SAN 582 H at harvest in corn after treatment with SAN 582 H 900 EC in France in 1991. Anadiag SA, Haguenau, France Unpublished

Perny, A. 1997b., Determination of residues of SAN 582 H at harvest in corn after treatment with SAN 582 H 900 EC in France in 1991. Anadiag SA, Haguenau, France Unpublished

Perny, A. 1997c., Determination of residues of SAN 582 H at harvest in corn after treatment with SAN 582 H 900 EC in France in 1991. Anadiag SA, Haguenau, France Unpublished

Pierotti, M.V. and Moore, P.A. 1992., Confined accumulation study of SAN-582H on rotational crops. Sandoz Agro Inc., Illinois, USA. Unpublished

Puy, E. and Wasser, C. 1993a., Determination of residues of dimethenamid in corn treated with SAN 582 H 900 EC applied under field conditions in Greece, 1992 -residues at harvest. Anadiag SA, Haguenau, France Unpublished

Puy, E. and Wasser, C. 1993b., Determination of residues of dimethenamid in corn treated with SAN 582 H 900 EC applied under field conditions in Greece, 1992 -residues at harvest. Anadiag SA, Haguenau, France Unpublished

Raunft, E., Benz, A. and Mackenroth, Ch. 1999., Study on the residue behaviour of dimethenamid in maize after treatment with BAS 656 02 H and BAS 656 07 H under field conditions in Belgium, Germany and the Netherlands, 1998. BASF AG., Limburgerhof, Germany Fed.Rep. Unpublished

Rozek, A 1988., Determination of the dissociation constant of SAN 582H. Sandoz Crop Protection Corporation, Illinois, USA. Unpublished

Scharf, J. 1999., Photochemical oxidative degradation of dimethemamid (QSAR estimates). BASF AG., Limburgerhof, Germany Fed.Rep. Unpublished

Schulz, H. 1999., Determination of the residues of dimethenamid and dimethenamid-P in grain maize following treatment with BAS 656 02 H and BAS 656 07 H under field conditions in Italy and Southern France 1998. Fresenius, Chem. und Biolog. Laboratorien, Taunusstein-Neuhof, Germany Fed.Rep. Unpublished

Sen, P.K. and Yu, C.C. 1994., SAN 582 H: Quantum yield determination. Sandoz Agro Inc., Illinois, USA. Unpublished

Smith, K. 1992., Analysis of corn samples for residues of the sulfonate metabolite of SAN-582H. Sandoz Agro Inc., Illinois, USA. Unpublished

Smith, K. 1993., Analysis of soybean grain and process fractions for residues of the sulfonate metabolite of SAN-582H. Sandoz Agro Inc., Illinois, USA. Unpublished

Smith, K. and Bade, T. 1991a., Determination of SAN-582H and its oxalamide metabolite in corn grain, forage, silage and fodder. AM-0840-0391-1. Sandoz Agro Inc., Illinois, USA. Unpublished

Smith, K. and Bade, T. 1991b., Determination of SAN-582H and its oxalamide metabolite in soybean forage, hay, grain, and straw. Method AM-0850-0291-0. Sandoz Agro Inc., Illinois, USA. Unpublished

Smith, K.L. 1992., Determination of the stability of residue of SAN-582H and its oxalamide metabolite in stored soybean samples. Sandoz Agro Inc., Illinois, USA. Unpublished

Stasiak, M. 1993., Analysis of Ontario soybean samples from the 1991and 1992 growing seasons for SAN-582H. Sandoz Agro Canada Inc., Ontario, Canada. Unpublished

Vaughn, F. 1993., Frontier raw agricultural commodity study. Residues in soybeans. Sandoz Agro Canada Inc., Ontario, Canada. Unpublished

Versoi, P.L. and Stewart, J. 2001., The magnitude of dimethenamid-P residues in grasses grown for seed in the Northwestern United States. BASF Corporation, NC, USA. Unpublished

Weeren, R.D. and Schmidt, F. 1995., Testing of DFG Method S 19 for the determination of residues of dimethenamid in corn. Dr Specht & Partner. BASF AG., Limburgerhof, Germany Fed.Rep. Unpublished

Wendt, D.R. 1997., Comparative aerobic soil metabolism of SAN 1289 H and SAN 582 H. Sandoz Agro Inc., Illinois, USA. Unpublished

Widlak, A. 1997., Density of SAN 1289 H, technical. Sandoz Agro Inc., Illinois, USA. Unpublished

Wofford, J.T., Guirguis, M. and Riley, M. 1999., Magnitude of S-dimethenamid residues in potato processed fractions. BASF Corporation, NC, USA. Unpublished

Yu, C.C. and Guirguis, A.S. 1992a., SAN 582 H: Addendum to a previous goat metabolism study. Sandoz Agro Inc., Illinois, USA. Unpublished

Yu, C.C. and Guirguis, A.S. 1990., Metabolism of SAN 582 H in a lactating goat. Sandoz Agro Inc., Illinois, USA. Unpublished

Yu, C.C. and Nietschmann, D.A. 1990a., Metabolism of SAN 582 H in laying hens. Sandoz Agro Inc., Illinois, USA. Unpublished

Yu, C.C. and Nietschmann, D.A. 1990., Material balance investigation in a goat orally administered 14C-SAN 582 H. Bio-Life Associates Ltd.; Neillsville; USA Unpublished

Yu, C.C. and Nietschmann, D.A. 1992., SAN 582 H: Addendum to a previous hen metabolism study. Sandoz Agro Inc., Illinois, USA. Unpublished

Cross reference

1988/11352	Rozek, A
1990/11093	Jimenez, N.C.
1990/11094	Bade, T.R.
1990/11108	Jimenez, N.C.
1990/11110	Yu, C.C. and Nietschmann, D.A.
1990/11112	Yu, C.C. and Guirguis, A.S.
1990/11113	Yu, C.C. and Nietschmann, D.A.
1991/11820	Smith, K. and Bade, T
1991/11823	Jimenez, N.C.
1991/11824	Bourry, R. and Hertl, P.
1991/11839	Bade, T.R.
1991/11840	Bourry, R. and Hertl, P.
1991/11841	Smith, K. and Bade, T
1991/11878	Jimenez, N.C.
1991/11879	Atallah, Y.H., Moore, P.A and Bade, T.R
1991/11888	Hertl, P.
1991/11889	Hertl, P.
1991/11890	Hertl, P.
1991/11891	Hertl, P.
1991/11892	Hertl, P.
1991/11893	Hertl, P.
1991/11894	Hertl, P.
1991/11895	Hertl, P.
1991/11896	Hertl, P.
1991/11897	Hertl, P.
1991/11899	Jimenez, N.C.
1992/12389	Smith, K.L.
1992/12400	Bade, T.R.

1992/12425 Pierotti, M.V. and Moore, P.A.
1992/12427 Smith, K.
1992/12430 Yu, C.C. and Nietschmann, D.A.
1992/12431 Yu, C.C. and Guirguis, A.S
1992/12432 Guirguis, A.S and Yu, C.C.
1992/12433 Jimenez, N.C.
1992/12434 Jimenez, N.C.
1992/12435 Jimenez, N.C.
1992/12436 Jimenez, N.C.
1992/12442 Jimenez, N.C.
1992/12443 Jimenez, N.C.
1992/12444 Jimenez, N.C.
1992/12499 Guirguis, A.S and Yu, C.C.
1992/12534 Jimenez, N.C.
1993/11181 Bourry, R., Hertl, P. and Karapally, J.C.
1993/11481 Bourry, R. and Hertl, P.
1993/11617 Puy, E. and Wasser, C.
1993/11644 Puy, E. and Wasser, C.
1993/11660 Kaethner, M.
1993/11748 Smith, K.
1993/11796 Formanski, L.J.
1993/5000022 Stasiak, M.
1993/5000184 McCurvin, D. and Stasiak, M.
1994/10636 Sen, P.K. and Yu, C.C.
1994/10643 Fricker, P. and Hertl, P.
1994/10861 Hertl, P. and Vogler, F.
1994/11282 Laban, S.L.
1995/10127 Weeren, R.D. and Schmidt, F.
1995/10129 Moore, P.A. and Wendt, D.R.
1995/10132 Kaethner, M.
1995/10454 Laban, S.L.
1995/10509 Laban, S.L.
1995/10781 Laban, S.L.
1995/11381 Hertl, P. and Fricker, P.
1995/5000228 Greenhalgh, R.
1995/5000229 Greenhalgh, R.
1996/11031 Dorn, C. and Fricker, P,
1996/11162 Laban, S.L.
1996/5411 Laster, W
1996/5418 Chen, H. and Laster, W.
1997/11159 Perny, A.
1997/11160 Perny, A.
1997/11161 Perny, A.
1997/5184 Guirguis, A.S.
1997/5186 Jones, R.
1997/5193 Widlak, A.
1997/5194 Chen, H.
1997/5196 Liu, J.
1997/5198 Chen, H.
1997/5198 Guirguis, A.S.
1997/5257 Wendt, D.R.
1997/5790 Vaughn, F.
1998/11306 Fuchs, A. et al.
1998/5071 Lam, W.W.
1998/5173 Lam, W.W.
1999/10004 Fegert, A. and Mackenroth, Ch.
1999/10005 Raunft, E., Benz, A. and Mackenroth, Ch.
1999/10006 Meumann, H., Benz, A and Mackenroth, Ch.
1999/10007 Schulz, H.
1999/10075 Scharf, J.
1999/10167 KröhL, T.
1999/5002 Hsieh, T.
1999/5018 Wofford, J.T., Guirguis, M. and Riley, M.
1999/5020 Haughey, D., Guirguis, M. and Riley, M.
1999/5057 Corley, J.
1999/5109 Guirguis, M. and Wofford, J.T.
2001/5002336 Versoi, P.L. and Stewart, J.
2004/5000740 Haughey, D.
2004/7007453 Arsenovic, M.