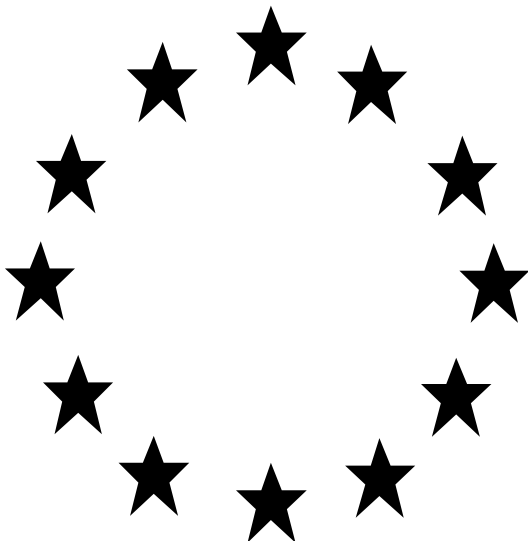


Draft Assessment Report (DAR)

- public version -

Initial risk assessment provided by the rapporteur Member State Germany for the existing active substance

CHLORIDAZON

of the third stage (part A) of the review programme referred to in Article 8(2) of Council Directive 91/414/EEC

Volume 1

July 2005

Draft
Assessment Report

12 December 2004

Chloridazon

Volume 1

Report and
Proposed Decision

Rapporteur Member State: Germany

Contents

Level 1

Chloridazon

Statement of Subject Matter and Purpose of Draft Assessment Report

1 Statement of subject matter and purpose for which the draft assessment report was prepared

1.1 Purpose for which the draft assessment report was prepared (Dossier Document A)

This draft assessment report is submitted to support first inclusion of the existing active substance chloridazon in Annex I of the Council Directive 91/414/EEC.

1.2 Summary and assessment of information relating to collective provision of dossiers (Dossier Document B)

As BASF is the only notifier, this point is not relevant.

1.3 Identity of the active substance (Annex IIA 1) (Dossier Documents J, K-II and L-II)

1.3.1 Name and address of applicant(s) for inclusion of the active substance in Annex I (Annex IIA 1.1)

Applicant:
BASF Aktiengesellschaft
Agricultural Products
Global Product Safety & Registration
P.O. Box 120
D-67114 Limburgerhof

Contact:
[redacted]

Alternative person:
[redacted]

Affiliates or representatives:
BASF Aktiengesellschaft
Agricultural Products
Business Management
P.O. Box 120
D-67114 Limburgerhof

Contact
[redacted]

1.3.2 Common name and synonyms (Annex IIA 1.3)

Chloridazon	(ISO)
Pyrazon	(USA, Canada, Denmark, Poland)
PAC	(Japan)

1.3.3 Chemical name (Annex IIA 1.4)

IUPAC: 5-amino-4-chloro-2-phenylpyridazin-3(2H)-one

CAS: 5-amino-4-chloro-2-phenyl-3(2H)-pyridazinone

1.3.4 Manufacturer's development code number (Annex IIA 1.5)

BAS 119 H, LAB 13 033, Reg.No.13 033

1.3.5 CAS, EEC and CIPAC numbers (Annex IIA 1.6)

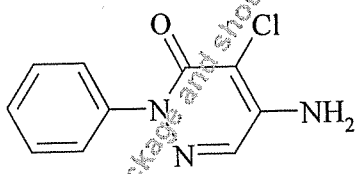
CAS:	1698-60-8
CIPAC:	111
EEC No.:	216-920-2
EG Index No.:	606-035-00-3

1.3.6 Molecular and structural formulae, molecular mass (Annex IIA 1.7)

Molecular formular: $C_{10}H_8ClN_3O$

Molecular mass: 221.65 g/mol

Structural formula:



1.3.7 Manufacturer or manufacturers of the active substance (Annex IIA 1.2)

[redacted]

1.3.8 Method or methods of manufacture (Annex IIA 1.8)

Confidential information, see Annex C.

1.3.9 Specification of purity of the active substance (Annex IIA 1. 9)

920 g/kg (minimum purity) which is in line with the FAO specification (AGP: CP/346, 1997).

1.3.10 Identity of isomers, impurities and additives (Annex IIA 1.10)

Confidential information, see Annex C.

1.3.11 Analytical profile of batches (Annex IIA 1.11)

Confidential information, see Annex C.

1.4 Identity of the plant protection product (Annex IIA 3.1; Annex IIIA 1) (Dossier Documents J, K-II, L-II, K-III, and L- III) (to be included for each preparation for which an Annex III dossier was submitted)

1.4.1 Current, former and proposed trade names and development code numbers (Annex IIIA 1.3)

Trade Name:	Pyramin WG, Pyramin DF	
Code Number:	Plant Protection Product:	BAS 119 33 H
	Active Substance:	Chloridazon or BAS 119 H
	BASF internal No.:	Reg. No. 013 033

1.4.2 Manufacturer or manufacturers of the plant protection product (Annex IIIA 1.2)

[redacted]

1.4.3 Type of the preparation and code (Annex IIIA 1.5)

Water dispersible granule (WG).

1.4.4 Function (Annex IIA 3.1; Annex IIIA 1.6)

Herbicide.

1.4.5 Composition of the preparation (Annex IIIA 1.4)

Confidential information, see Annex C.

1.5 Use of the plant protection product (Annex IIA 3.2 to 3.4; Annex IIIA 3.1 to 3.7, 3.9, 12.1) (Dossier Documents C, D, and E) (to be included for each preparation for which an Annex III dossier was submitted)

1.5.1 Field of use (Annex IIA 3.3; Annex IIIA 3.1)

BAS 119 33 H is used as herbicide. BAS 119 33 H acts as a systemic soil and leaf herbicide. The use of chloridazon and its formulations is solely in the agricultural field.

The range of weeds which are susceptible (> 85 %) to chloridazon is represented by:

Apera spica-venti, Capsella bursa pastoris, Galeopsis tetrahit, Lamium purpureum, Matricaria chamomilla, Papaver rhoeas, Poa annua, Polygonum persicaria, Senecio vulgaris, Sinapis arvensis, Solanum nigrum, Stellaria media, Thlaspi arvensis, Veronica hederifolia and persica

Weeds which are less susceptible (60 - 85 %) to chloridazon:

Amaranthus retroflexus, Anagallis arvensis, Atriplex patula, Centaurea cyanus, Chenopodium album, Lamium amplexicaule, Mercurialis annua, Myosotis arvensis, Polygonum aviculare, Polygonum convolvulus, Raphanus raphanistrum, Viola arvensis

Not sufficiently controlled weeds (≤60 % weed control) by chloridazon:

Agropyron repens, Cirsium arvense, Convolvulus arvensis and Calystegia arvensis, Euphorbia spec., Fumaria officinalis, Galium aparine

1.5.2 Effects on harmful organisms (Annex IIA 3.2; Annex IIIA 3.2)

Chloridazon belongs to the chemical class of the pyridazinones. Chloridazon acts as a photosynthesis inhibitor in the chlorophyll biosynthesis pathway.

The herbicidal effects of chloridazon are primarily due to its inhibition of the photosynthetic electron transport within the chloroplasts through binding to the D1-protein of photosystem II. When applied preplant incorporated, pre- or post-emergence, the compound selectively controls important annual broad-leaved weeds in sugar and fodder beets as well as redbeet and mangels.

Plant uptake and translocation. The selective systemic herbicide is rapidly absorbed by the roots and shoot parts with translocation acropetally and, to a lower extent, basipetally to all

plant parts. When applied pre-emergence, chloridazon is taken up via the roots and shoot parts of the plant influenced by soil moisture, temperature and slightly by relative humidity.

Mechanism of selectivity. Studies on the mechanism of selectivity of chloridazon showed no notable differences in the uptake of the compound between weeds and the crop species sugar beet.

Since the metabolic degradation of chloridazon was found to be more rapid in the crop species than in weeds, it is suggested that the mechanism of herbicide selectivity lies in a different rate of metabolism.

In spite of their long term use and broad spectrum of weeds targeted no resistance in weeds has evolved to the chlorophyll biosynthesis inhibitors as a result of selection pressure due to these herbicides. Chloridazon was registered in Europe in 1966 and used primarily as the single pre-emergence herbicide. When phenmedipham was registered in 1972 also combinations at post-emergence application were established to minimise the risk of resistant plants.

Today the application of chloridazon is mostly pre-emergence with two post-emergence applications of soil and leaf herbicides to follow in order to provide weed and grass control for a whole season.

In summary, the risk of developing resistance in target weeds when applying chloridazon is low.

1.5.3 Summary of intended uses (Annex IIA 3.4; Annex IIIA 3.3 to 3. 7, 3.9)

Summary of representative uses evaluated (chloridazon, 12.12.2004)

Crop and/ or situation (a)	Member State or Country	Pro-duct name	F G or I (b)	Pests or Group of pests Controlled (c)	Formulation		Application				Application rate per treatment			PHI (days) (l)	Remarks: (m)
					Type (d-f)	Conc. of g as/kg (i)	Method, Kind (f-h)	Growth stage & Season (j)	Num-ber min max (k)	Interval between applica-tions (min)	kg as/hL min max	Water L/ha min max	kg as/ha min max		
Northern Europe															
Beta beet, onion, shallot, garlic, flowers and nursery			F	Weeds (general) up to BBCH 14-16	WG	650	Hydraulic sprayer overall	Pre-seeding Pre-emergence up to BBCH 19	1 3	-	0.65 - 1.3	200 - 400	max. 2.6	[1]	supported under the provision: max. of 2.6 kg/ha only every third year on the same field
Southern Europe															
Beta beet			F	Weeds (general) up to BBCH 14-16	WG	650	Hydraulic sprayer overall	Pre-seeding Pre-emergence up to BBCH 19	1	-	0.43 - 1.3	200 - 600	max. 2.6	[1]	supported under the provision: max. of 2.6 kg/ha only every third year on the same field

(a) For crops, the EU and Codex classifications (both) should be used; where relevant, the use situation should be described (*e.g.* fumigation of a structure)
(b) Outdoor or field use (F), glasshouse application (G) or indoor application (I)
(c) *e.g.* biting and suckling insects, soil born insects, foliar fungi, weeds
(d) *e.g.* wettable powder (WP), emulsifiable concentrate (EC), granule (GR)
(e) GCPF Codes - GIFAP Technical Monograph No 2, 1989
(f) All abbreviations used must be explained
(g) Method, *e.g.* high volume spraying, low volume spraying, spreading, dusting, drench
(h) Kind, *e.g.* overall, broadcast, aerial spraying, row, individual plant, between the plant - type of equipment used must be indicated
(i) g/kg or g/L
(j) Growth stage at last treatment (BBCH Monograph, Growth Stages of Plants, 1997, Blackwell, ISBN 3-8263-3152-4), including where relevant, information on season at time of application
(k) Indicate the minimum and maximum number of application possible under practical conditions of use
(l) PHI - minimum pre-harvest interval/[1] PHI covered by conditions of use
(m) Remarks may include: Extent of use/economic importance/restrictions/RMS: not/supported by available data

1.5.4 Information on authorisations in EU Member States (Annex IIIA 12.1)

Current authorisations (July 2003) of different products containing chloridazon are registered for use predominantly in beet crops against weeds in the following Member States of the EU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxemburg, Netherlands, Portugal, Spain, Sweden, United Kingdom.

Level 2

Chloridazon

Overall Conclusions

2 Reasoned statement of the overall conclusions

2.1 Identity

2.1.1 Identity

All points (Annex II and III) have been addressed and the information supplied is acceptable.

2.1.2 Physical and chemical properties

Chloridazon is a colourless stable solid (mp. 206 - 207 °C). It is poorly soluble in most of the tested organic solvents and slightly soluble in water. The vapour pressure (1 10^{-9} Pa) and volatility (5.3 10^{-10} Pa m^3 mol^{-1}, 20 °C) of chloridazon are very low. The active is hydrolytical stable and undergoes rapidly a photolytical degradation.
The techn. material is under the test conditions not explosive, has no auto-ignition temperature and does not burn.

Pyramin WG is a dark brown, free flowing water dispersible granule with a moderate smoky odour. It has neither explosive nor oxidising properties and it is not highly flammable. Its pH-value of 8.9 lies within the naturally occurring range. The results of the accelerated storage test and the shelf life test confirm its stability at least for two years under practical and commercial conditions. Its technical properties indicates no particular problems when used as recommended.

2.1.3 Details of uses and further information

2.1.3.1 Details of uses

BAS 119 33 H has been used in all beet crops. The application rate is 4.0 kg/ha of the preparation BAS 119 33 H. In terms of active substance, this is 2600 g as/ha. Based on the assumption that in practical farming the spray volume varies between 200 and 400 L/ha, the concentration of the active substance in the spray varies between 1.2 g/L and 0.6 g/L.

The intended method of application is spraying by means of each type of spraying equipment which is normally used in practical agricultural production.

The number of applications is 1 (one) to 3 (three). The timing of the application is between pre-seeding resp. pre-emergence up to crop growth stage 19 (BBCH Code). The growth of weeds should not exceed the growth stage 14 -16 (BBCH Code).

Waiting periods or other precautions to avoid phytotoxic effects on succeeding crops are not necessary to be established.

There are no limitations on the choice of succeeding crops in the full growing period. After a crop failure only sugar and fodder beet, beet root, maize and chard can be grown.

For effective weed control, chloridazon can be used pre- and post-emergence of the crop. In pre-emergence, the compound can be used prior to seeding with shallow incorporation into the soil, or after seeding of the crop. When soil moisture is a low, preplant incorporation (ppi) of chloridazon provides higher levels of herbicidal efficacy compared to applications after seeding of the crop.

At post-emergence, chloridazon is also taken up by the shoot of the weeds. For best effects in post-emergence, weeds should be small and soil should be moist.

In farming practice, chloridazon is usually integrated in spray sequences and tank mixes with other soil or foliar herbicides. Examples for common uses of chloridazon in sugar beets are:

1. Chloridazon in pre-emergence followed by two post-emergence applications of chloridazon in tankmix with phenmedipham and ethofumesate herbicides

2. Three post-emergence applications of chloridazon in tankmix with phenmedipham and ethofumesate herbicides.

More detailed information concerning the application is given in VOL III.

2.1.3.2 Further information

Information on handling, storage, transport or fire, destruction or decontamination, and emergency measures for the active substance as manufactured and information on packaging, cleaning procedures, handling, storage, transport or fire, emergency measures, and procedures for destruction or decontamination for the plant protection product have been supplied and are acceptable.

2.1.4 Classification and labelling

Active Substance: Chloridazon

On the basis of the toxicological data submitted, no classification of chloridazon is proposed.

Classification according to Annex I to directive 67/548/EEC:

Hazard symbol:	Xi	
Indication of danger:	Irritant	
Risk phrase:	R 43	May cause sensitisation by skin contact.

The following is proposed in accordance with the latest classification and labelling guidance under Directive 67/548/EEC (i.e. in the 18th ATP published as Directive 93/21/EEC):

Hazard symbol:		N
Indication of danger:		Dangerous to the Environment
Risk phrases:	R 51/53	Toxic to aquatic organisms/May cause longterm adverse effects in the aquatic environment.

Preparation: BAS 119 33 H (Pyramin WG; Pyramin DF)

The following is proposed in accordance with the Directive 1999/45/EC:

Hazard symbol:		Xn
Indication of danger:		Harmful
Risk phrases:	R 20	Harmful by inhalation.
	R 22	Harmful if swallowed.

Reasons for classification

For justification of R 20 see	B.6.11.3:	Inhalation toxicity.
For justification of R 22 see	B.6.11.1:	Oral toxicity.

The following is proposed in accordance with Directive 78/631/EEC in combination with the latest classification and labelling guidance under Directive 67/548/EEC (i.e. in the 18th ATP published as Directive 93/21/EEC):

Pyramin WG, Pyramin DF (BAS 119 33 H)

Hazard symbol:		N
Indication of danger:		Dangerous to the Environment
Risk phrases:	R 51/53	Toxic to aquatic organisms/May cause longterm adverse effects in the aquatic environment.

2.2 Methods of analysis

2.2.1 Analytical methods for analysis of the active substance as manufactured

Analytical methodology is available for the determination of the active substance and the impurities in the technical material as manufactured.

Chloridazon in the active substance as manufactured is determined by a HPLC external standard method on a reversed phase column with UV detection (CIPAC method).

[redacted] impurities in the technical active substance are determined by HPLC [redacted] with UV detection [redacted]

The methods are validated. Concerning the impurities the linearity is only proven for the main impurity Reg No. 13 344.

2.2.2 Analytical methods for formulation analysis

Analytical methodology is available for the determination of the active substance in the formulation.

Chloridazon in the formulated product is determined by HPLC external standard method on a reversed phase column with UV detection (CIPAC method).

The method is fully validated.

2.2.3 Analytical methods for residue analysis

For the assessment of the analytical methods for the determination of chloridazon residues the following criteria were used:

- The submitted methods enable the enforcement of the following relevant residue limits (at the time of evaluation):

Matrix	Limit		Comment
plants and plant products	0.3	mg/kg	proposed MRL for sugar beet
	0.5	mg/kg	proposed MRL for red beet
	0.2	mg/kg	proposed MRL for onion
	3	mg/kg	proposed MRL for chard residue definition: chloridazon and metabolite B expressed as chloridazon equivalents
animal products	0.1	mg/kg	general, residue definition: metabolite B
soil	0.05	mg/kg	limit of quantification, if as or metabolite is not highly phytotoxic or toxic to non-target organisms residue definition for enforcement: parent
drinking water	0.1	µg/L	EU drinking water limit; residue definition for enforcement: parent, metabolite B and metabolite B-1
surface water	0.6	mg/L	based on the EC_{50} of *Pseudokirchneriella subcapitata,* residue definition for enforcement: parent
air	60	µg/m³	based on a proposed $AOEL_{systemic}$ of 0.2 mg/kg bw/d

- Mean recovery rates at each fortification level in the range of 70 to 110 % with a relative standard deviation of ≤ 20 %
- No interfering blanks (< 30 % of the LOQ)
- Methods must employ the simplest approach, involve the minimum cost, and require commonly available equipment.

- The enforcement method for food must be suitable for the determination of all compounds included in the residue definition for enforcement (see B 7.3) and must be checked in an independent laboratory.
- The enforcement methods for environmental matrices must be able to analyse for all compounds of toxicological and/or ecotoxicological significance in soil, water and air (see B 8.9).
- An additional confirmatory method for all matrices is supplied.

According to these criteria adequate analytical methods are listed in Table B.5.5-1. This overview shows, that most of the needed methods are available. However, with one exception validated confirmatory methods are not presented for all kinds of food (for a summary see Table 2.2-1). For air no confirmatory method was submitted. Because of the high systemic AOEL only an LOQ of 60 µg/m^3 has to be reached. The submitted method was validated at the much lower LOQ = 3 µg/m^3. Therefore, a confirmation is very simple and a validated confirmatory method is not considered necessary.

Table 2.2-1: Methods for the determination of residues

Matrix type	Matrix	Residue component	Method	Limit of quantification		Reference
crops	Sugar beet (tops), Sugar beet (roots), Refined sugar, Molasses	Chloridazon Metabolite A Metabolite B	GC/NPD HPLC-UV	0.05 0.05	mg/kg mg/kg	Movassaghi, S., 1994
	Sugar beet (tops), Sugar beet (roots	Chloridazon Metabolite A Metabolite B	GC/NPD HPLC-UV	0.05 0.05	mg/kg mg/kg	Schulz, H., 1996
	Cucumber, orange, wheat grain, rape seed, onion bulb, sugar beet (root), sugar beet (plant with root), sugar beet (plant without root)	Chloridazon	HPLC-MS/MS	0.05	mg/kg	Kerl, W., 2002a
	Cucumber, orange, wheat grain, rape seed, onion bulb, sugar beet (root), sugar beet (plant with root), sugar beet (plant without root)	Chloridazon	HPLC-MS/MS	0.05	mg/kg	Kang, J., 2001
	Cucumber, orange, wheat grain, rape seed, onion bulb, sugar beet (root), sugar beet (plant with root), sugar beet (plant without root)	Metabolite B	HPLC-MS/MS	0.05	mg/kg	Kerl, W., 2002b
	Lemon, cucumber, orange, wheat grain, rape seed, onion bulb, sugar beet (plant with root), sugar beet (root), sugar beet (plant without root)	Metabolite B	HPLC-MS/MS	0.05	mg/kg	Schulz, H., 2002a
	Onion (plant w/o root), onion, bulb	Sum of chloridazon and metabolite A	HPLC-MS/MS	0.05	mg/kg	Kerl, W. and Mackenroth, C., 2003
animal	Bovine milk Bovine muscle, liver, kidney, fat	Chloridazon	GC/ECD	0.01 0.05	mg/kg mg/kg	Zehr, R.D., 1996
	Hen egg	Chloridazon	GC/ECD	0.05	mg/kg	Kampke-Thiel, K.,1998

Matrix type	Matrix	Residue component	Method	Limit of quantification		Reference
	Bovine milk Bovine muscle, liver, kidney, fat, hen egg	Chloridazon	HPLC-MS/MS	0.01 0.05	mg/kg mg/kg	Hartl, M., 2002
	Bovine milk Bovine muscle	Chloridazon	HPLC-MS/MS	0.01 0.05	mg/kg mg/kg	Class, Th., 2002
	Bovine milk Bovine muscle, liver, kidney, fat, hen egg	Metabolite B	HPLC-MS/MS	0.01 0.05	mg/kg mg/kg	Hartl, M., 2001
	Bovine milk Bovine liver	Metabolite B	HPLC-MS/MS	0.01 0.05	mg/kg mg/kg	Stout, C., 2001
soil	Standard soil, US soil, sediment	Chloridazon	HPLC/UV, DAD	0.01	mg/kg	Grote, C., 2000
water	Surface water	Chloridazon	HPLC-UV, DAD	0.05	µg/L	Keller, W., 1999
	Tap water	Chloridazon Metabolite B Metabolite B-1	HPLC/UV, DAD	0.05 0.05 0.05	µg/L µg/L µg/L	Keller, W., 1999
air	Air, 38 °C / 93 % rel. humidity	Chloridazon	HPLC/UV	3 (0.05 µg/tube)	µg/m^3	Class, Th., 1994

2.3 Impact on human and animal health

2.3.1 Effects having relevance to human and animal health arising from exposure to the active substance or to impurities contained in the active substance or to their transformation products

2.3.1.1 Metabolism / Toxicokinetics

After single oral administration of ^{14}C-chloridazon to male and female rats at dose levels of 20 mg/kg bw and 200 mg/kg bw, the active substance was rapidly absorbed from the gastro-intestinal tract. The absorbed material was rapidly excreted mostly via urine (between 85 % and 90 %) and feces (7 % - 26 %) with a half-life of 16 to 49 hours. There were no significant differences between the high and low dose level or any sex-related differences regarding rates and routes of excretion. A comparison of the excretion balance after oral vs. intravenous administration showed that virtually all radioactivity in the feces was related to biliary excretion, which was found to be 12 % to 37 % of the dose. The bioavailability was approximated to be 96 - 100 %.

Excretion after a 14-day pre-treatment was even faster than after a single low dose. C_{max} increased less than proportionally with dose. The AUC was linear over the tested dose range for male rats, while in females the AUC value increased slightly less than proportionally with the dose indicating a marginally lower absorption at the high dose level.
After a 7-day treatment with 20 mg/kg bw/day, highest amounts of radioactivity were found in the heart, adrenal glands and in the gastro-intestinal tract. There was a steady decline in the radioactivity in all organs and tissues indicating that chloridazon has no accumulating potential.

After oral dosing, chloridazon was rapidly metabolised in the rat by oxidative mechanisms. The main transformation is the hydroxylation of the parent compound at the phenyl ring moiety. This metabolite is then converted either to its glucuronide or sulfate. Subsequent hydroxylation at the phenyl ring or - to a lesser extent - dechlorination of the sulfate conjugate was also observed. Three major of at least 9 metabolites were found in urine.

The dermal absorption of ^{14}C-BAS 119 H in the formulation (BAS 119 50 H) and 1:6 and 1:33 aqueous dilutions thereof was studied in male Wistar rats following a single dermal administration. The dermal absorption was found to be approximately 4 % (10 h exposure; including skin residues) both for the diluted and undiluted product.

2.3.1.2 Acute toxicity studies, local irritation and skin sensitising properties

The acute oral toxicity of isomer reduced chloridazon in rats is low. Female rats were more sensitive (LD_{50} 2.140 mg/kg bw) than males (> 3.830 mg/kg bw). Chloridazon with higher isomer content appears to be slightly more toxic after acute oral exposure to rats, however a different rat strain (Sprague Dawley opposed to Wistar) might have also influenced the results (LD_{50} > 1.000 < 1.470 mg/kg bw). The acute oral LD_{50} in mice was determined to be 605 mg/kg bw for males and 598 mg/kg bw for females.

Chloridazon, whether isomer reduced or isomer rich, was virtually non toxic to Wistar or CRJ-SD rats after dermal application. The LD_{50} values were above 2.000 mg/kg bw causing neither mortality nor systemic toxicity. In addition, no local reaction was observed in these studies at the application site.

The inhalation toxicity of aerosols of chloridazon, both isomer reduced and isomer rich, is low (LC_{50} > 5.4 or > 39.8 mg/L over 4 h, respectively). There was only a slight irritation of the airways during exposure in the dust aerosol study. Minor differences in clinical signs in the two inhalation studies might be due to differences in the exposure techniques and the fact that a different rat strain was used.

Isomer reduced chloridazon was non irritant in a skin irritation study in rabbits. Both - isomer reduced and non-reduced forms - of chloridazon were non irritant to the eye. Isomer reduced chloridazon was not a skin sensitiser in the Guinea pig maximisation test.

2.3.1.3 Short-term toxicity

The 4-week short term oral toxicity of chloridazon was investigated in rats and dogs. For both species a dose level of 10.000 ppm proved to be too high (animals in moribund condition).

To determine whether there are differences in toxicity between both qualities of chloridazon, chloridazon isomer rich (original lower purity) and isomer reduced (higher purity) were tested comparitively in two 4-week feeding studies in Wistar rats. A dose of 5.000 ppm in rats resulted in reduced food consumption, body weight and slight clinical chemical changes (e.g. increased cholesterol values). Target organs were the kidneys and liver. There were no major differences between the two qualities.

Beagle dogs dosed up to 2.700 ppm did not demonstrate test substance related effects. At 5.000 ppm reduced food consumption and body weight development were noted. There was a slight anemic effect in females. A few clinical chemical parameters (e.g. increased cholesterol) were affected. The target organs were the liver and the kidneys.

The 4-week toxicity of chloridazon is comparable in rats and dogs. The NOAEL in dogs is 81.9 mg/kg bw/day, in rats 40 mg/kg bw/day. The latter value, however, is the result of a wide spacing of the dose levels (500 ppm as NOAEL and 5.000 ppm as LOAEL).

The subchronic toxicity of chloridazon was studied in 90 days studies in rats, mice and dogs.

In Sprague Dawley rats a dose of 19.200 ppm proved to be too high and was reduced to 9.600 ppm after 5 weeks. At this dose and at 4.800 ppm reduced food consumption and body weight gain was observed. Reduced erythrocyte and hemoglobin values in females and altered clinical chemical changes (indicating an impairment of liver function) were observed at the high dose level only. The target organ was the liver: increased weight (4.800 ppm and higher – both sexes and 1.200 ppm females), hepatocyte enlargement, decreased glycogen content (4.800 ppm and higher). The NOAEL was 300 ppm (approximately 21 mg/kg bw/day).

In B6C3F1 mice reduced food consumption and body weight was noted at 7.500 ppm. Body weight was also reduced in 1.500 ppm males. At 1.500 ppm and higher reduced triglyceride and cholesterol values were seen in males. The target organ was the liver: increased weight (7.500 ppm both sexes, 1.500 ppm males). The NOAEL was 300 ppm in males (65 mg/kg bw/day) and 1.500 ppm in females (467 mg/kg bw/day).

In Beagle dogs three 90 days studies were carried out. Toxicity was observed at dose levels of 4.000 ppm and higher. Toxicity consisted of reduced body weight gain and reduced protein values suggesting impaired liver function. The target organs were the liver (increased weight) and the kidneys (increased weight in males and vacuolisation of distal renal tubules in females). The overall NOAEL was established at 3.000 ppm (97 mg/kg bw/day).

The 12-month oral toxicity of chloridazon was studied in beagle dogs. Toxicity was observed at dose levels of 1200 ppm and higher. Toxicity consisted of slightly reduced food consumption in both sexes (6000; 8000 ppm) and reduced body weight gain in females (1200; 3600 ppm), increased inorganic phosphate in both sexes (6000; 8000 ppm) and reduced bilirubin in males (8000 ppm). Target organs were the kidneys and the gastric mucosa, possibly due to local irritation. The LOEL in dogs is 1200 ppm and the NOAEL 400 ppm equivalent to 11 mg/kg bw/day.

In conclusion, the short-term oral toxicity of chloridazon was characterised by effects on the body weight and the liver in all three species tested. At high dose levels liver function was impaired resulting in clinical chemical changes, whereas at lower dose levels only liver

weight increases were seen. Kidney toxicity and effects on the gastric mucosa were observed in dogs at very high dose levels.

In a 21-day dermal study in New-Zealand White rabbits neither systemic toxicity nor signs of local irritation were observed at a dose level of 1.000 mg/kg bw/day indicating the very low toxic potential of the test substance after dermal exposure.

Based on the above described findings, the relevant NOAELs from the short-term toxicity studies are listed below.

Table B.2.3-1: NOAEL´s from short-term studies in different species (mg/kg bw/day)

Species	Route	Males	Females
Rat	oral – 4 weeks	40	40
Dog	oral – 4 weeks	81.9	81.9
Rat	oral – 3 months	21	23.5
Mouse	oral – 3 months	65	467
Dog	oral – 3 months	97	97
Dog	oral - 12 months	11	11
Rabbit	dermal – 3 weeks	1.000	1.000

2.3.1.4 Genotoxicity studies

Chloridazon was evaluated for possible mutagenic/genotoxic effects *in vitro* and *in vivo*. It was negative in 4 out of 5 reverse mutation assays in bacteria (Ames test). The only positive response was obtained in one of the oldest tests with the isomer rich quality at doses causing test substance precipitation. In this study precipitation was observed at very low doses (1.000 µg/plate) in contrast to the other studies. In addition, the effect observed was marginal (maximum 1.5 fold increase with and without metabolic activation). The marginally increased mutation frequency suggests that an impurity or physical properties (precipitation) may have been responsible for this finding. This interpretation is further supported by the negative results obtained in tests with other batches conducted under the same test conditions. Therefore, it is concluded that the present isomer reduced technical active substance is negative in the Ames test including *Salmonella* and *E. coli* test strains. Chloridazon showed also negative results in a reverse mutation assay in a special *E. coli* strain (*E. coli* K 12 (343/113)).

Point mutations in mammalian cells were assessed in Chinese hamster ovary cells (HPRT assay). In this study no mutagenic effects were observed.

In the chromosome aberration test *in vitro* in human lymphocytes no increase of mutation frequency was noted.

DNA damage and repair was investigated *in vitro* in bacterial cells (recombination assay with *Bacillus subtilis*) in two experiments and in the UDS test in primary rat hepatocytes. In all 3 experiments there was no indication of DNA damage and repair caused by chloridazon.

In two *in vivo* studies, NMRI in mice, a micronucleus tests (single oral application) and a dominant lethal assay (gavage for five consecutive days), the absence of a genotoxic potential of chloridazon was confirmed.

The studies conducted sufficiently cover all endpoints to be investigated in mutagenicity and genotoxicity testing. Chloridazon has no mutagenic and no genotoxic potential.

2.3.1.5 Long-term toxicity / carcinogenicity studies

In a recent long-term study in Wistar rats body weight gain was reduced at doses of 1.000 and 2.000 ppm. At the high dose level (2.000 ppm) several red blood cell parameters were reduced indicating an anaemic effect. In addition, the thromboplastin time was decreased and a few clinical chemical parameters were altered. There were no specific target organs in the long-term rat study. The NOAEL in this study was 300 ppm (13 mg/kg bw/day).

In a recent carcinogenicity study in Wistar rats the only effect seen in the high dose groups (1.000 ppm) was reduced body weight. The NOAEL in this study was 300 ppm (13 mg/kg bw/day).

In an older study in Sprague Dawley rats food consumption and body weight gain was impaired in males and females at 4.050 ppm. At this dose level red blood cell parameters were reduced mainly in females. In high dose females cholesterol was increased and several organ weights were altered, however, without corresponding histopathological changes.
The increased incidence of muscular atrophy in high dose females correlates with the observation of "prominence of shoulder blades" in these animals. An increased incidence and grade of muscular atrophy was also observed in high dose males. The observations were confirmed in the additional histopathological examinations.The only test substance related change in the 1.350 ppm group was a slight increase in the incidence and grade of muscular atrophy in females. The fact that similar observations were not found in the more recent long-term studies in rats, in doses up to 2.000 ppm may be related to different sensitivities of the different rat strains implied. The NOAEL of this study was 450 ppm (20 mg/kg bw/day).

The overall NOAEL for the chronic rat toxicity was 300 ppm (13 mg/kg bw/day).

Chloridazon was not carcinogenic in any of the long-term studies in rats.
In a more recent carcinogenicity study, B6C3F1 mice treated with a very high dose level (5.000 ppm) showed reduced body weight gain and an increase of relative liver weights only. The NOAEL in this study was 1.000 ppm equivalent to 134 mg/kg bw/day in males and 158 mg/kg bw/day in females.

In an older long-term study in CFLP mice reduced body weight gain, increased liver weights and histopathological signs of an adaptation of the liver were observed at 20,000 ppm. The NOAEL in this study was 4.000 ppm (351 mg/kg bw/day in males and 423 mg/kg bw/day in females).

The overall long term NOAEL in mice was 1000 ppm (134 mg/kg bw/day),

Chloridazon was not carcinogenic in both long-term studies in mice.

The relevant NOAELs are shown in the table below.

Table B.2.3-2: Long-term NOAELs in mg/kg bw/day

Study	Males	Females
long-term rats	13	18
long term mouse	134	158

In conclusion, chloridazon was not carcinogenic in rats and in mice. Long-term studies in rats and mice identified kidney, liver, blood and skeletal muscle as target organs.

2.3.1.6 Reproductive toxicity / developmental (teratogenicity) studies

In a recent study chloridazon was administered via the feed to Wistar rats for two consecutive generations at dose levels of 0, 100, 400 and 1.600 ppm. Effects on parental animals (body weight, body weight gain, increased triglycerides and liver weights, hepatocyte swelling and lipid deposits) were noted at the high dose. The only finding in pups was a reduced body weight and body weight development at this dose level. No effects were noted at the low and mid dose level for parental animals and their offspring. The NOAEL for systemic toxicity in parental animals and offspring was 400 ppm (37 mg/kg bw/day). There was no indication of an impairment of fertility in both sexes at all dose levels, thus the NOAEL for reproductive performance and fertility was 1.600 ppm (about 148 mg/kg bw/day)

In an older multigeneration study, where CFY rats had been treated via the feed over three consecutive generations with doses of 0, 150, 440 and 1.350 ppm, no effects on parental animals and pups were noted at any dose level. Similarly, there were also no adverse effects on reproduction and fertility parameters. The dose levels were in the same range as in the above-mentioned 2-generation study, however, the scope of examination was not as extensive. The relevant NOAELs should (therefore) be derived from the more recent 2-generation study.

In a pre-, peri-, postnatal feeding study in NMRI mice according to FDA method (segment II and III) no effects were noted in the prenatal phase (segment II) in dams treated with 0, 5.000 and 10.000 ppm. There was also no indication of embryo-/fetotoxicity and no malformations were noted. In the peri-/postnatal phase (segment III) with identical doses the pup vitality index was slightly reduced at 10.000 ppm (1.742 mg/kg bw/day) in the test group where dams received chloridazon throughout pregnancy up to day 21 post partum. The effect was not noted in the test group when the dams had only been treated during the gestation period. In addition, there was a slight increase in liver weights of dams and pups. No other adverse effects were noted for dams and pups including pup examination for anomalies, variations or malformations. No adverse effects were noted at the 5.000 ppm dose level (905 mg/kg bw/day).
When chloridazon was administered by gavage to Wistar rats in a prenatal toxicity study maternal toxicity was marked at the high dose of 250 mg/kg bw leading to reduced food consumption, impairment of body weight and body weight development (including corrected body weight gain) and clinical symptoms (piloerection). At 50 mg/kg bw/day, there was a slight effect on food consumption and body weight gain. The effects were not seen at a lower dose of 10 mg/kg bw/day. There was no indication that the administration of chloridazon caused embryo-/fetotoxicity or malformations at any dose levels.

When chloridazon was administered by gavage to Chinchilla Russian rabbits, maternal toxicity at the doses of 165 mg/kg bw/day and 495 mg/kg bw in form of impairment of food

consumption and body weight was observed. The NOAEL was 55 mg/kg bw/day. No adverse effects on embryo-/fetal development - including the occurrence of malformations - could be noted even at the high dose of 495 mg/kg bw/day which showed clear maternal toxicity.

The following NOAELs have been established for reproduction toxicity including fertility and prenatal toxicity of chloridazon:

Table B.2.3-3: Reproduction toxicity NOAELs in mg/kg bw/day

Study	Parental/maternal toxicity	Developmental toxicity	Fertility
2-generation rat	37	37	148
pre-, peri-, postnatal mouse	905	905	-
prenatal toxicity rat	10	250	-
prenatal toxicity rabbit	55	495	-

In conclusion, there were no adverse effects on reproduction and fertility and also no adverse effects in fetuses of rats, mice and rabbits.

2.3.1.7 Neurotoxicity / Delayed neurotoxicity studies

With regard to neurotoxicity no indications of an acute or subchronic neurotoxic effect could be derived from the toxicity studies performed with chloridazon. Chloridazon showed no clinical signs in any of the toxicity studies which could be attributed to neurotoxicity and no indications on histopathological changes on the central or peripheral nerve system were seen in the short-term, long-term or reproductive/developmental studies in rats, mice and dogs.

2.3.1.8 Further toxicological studies

A number of toxicological studies with metabolites of chloridazon was performed.
Metabolite B (Reg. No. 14456) was demonstrated to be virtually non-toxic after acute oral administration with a LD_{50} in rats of approx. 5.000 mg/kg bw for males and > 5.000 mg/kg bw for females.

Chloridazon metabolite B did not show mutagenic or genotoxic properties in three tests (Ames test, V79/HPRT test, *in vitro* cytogenetics).

The short-term toxicity of chloridazon metabolite B is characterised mainly by kidney and descending urinary tract toxicity. Increased drinking water consumption and altered urinalysis parameters are considered to be related to the kidney toxicity. Kidney and urinary tract toxicity was observed in several studies. Female rats were more affected than males. The second target organ was the liver, with weight increases, altered fat distribution and increased number and size of vacuoles. At very high dose levels food consumption and body weight gain were impaired.

In a 4-week study in rats a NOAEL of 90 mg/kg bw/day was obtained. Three 3-month studies were conducted in rats. In an early study in Sprague-Dawley rats a NOAEL of 86 mg/kg bw/day was obtained. However, as the batch of the test substance was not identified and no analytical data provided the study was not used for the establishment of the most relevant NOAEL. In the second 3-month study in Wistar rats the LOEL was 750 ppm. A NOAEL was

not established in this study. In a follow up 3-month study a NOAEL of 200 ppm (15 mg/kg bw/day) was obtained. The overall NOAEL for the short term toxicity of chloridazon metabolite B was 15 mg/kg bw/day.

In a prenatal toxicity study in rats maternal toxicity (reduced body weight gain and hematurea indicating kidney toxicity) was observed at 120 mg/kg bw/day, the NOAEL being 60 mg/kg bw/day. These findings are consistent with the observations in the short term feeding studies in rats. There were no signs of developmental toxicity including no test substance related malformations up to the top dose level of 120 mg/kg bw/day.

In conclusion chloridazon metabolite B was virtually not toxic after acute oral administration, it was not mutagenic, not genotoxic and demonstrated no developmental toxicity. In short term feeding studies the target organs were liver and kidney. The overall NOAEL for the short term toxicity of chloridazon metabolite B was 15 mg/kg bw/day.

An acute oral toxicity study with chloridazon metabolite B-1 (Reg. No. 035 375) revealed an LD_{50} of 1,200 mg/kg bw.

Chloridazon metabolite B-1 was found to be not mutagenic in the *Salmonella typhimurium/Escherichia coli* reverse mutation assay and not mutagenic in the CHO/HPRT mutation assay. It was negative in the *in vitro* UDS assay using primary rat hepatocytes. Additionally, chloridazon metabolite B-1 had no *in vivo* chromosome-damaging (clastogenic) effect in bone marrow cells of Wistar rats.

The no observed adverse effect level in a 3-month dietary rat study was 50 mg/kg bw/day for males and females (highest dose tested).

In a prenatal developmental study in Wistar rats maternal toxicity was seen at 50 mg/kg bw/day (highest dose level). Signs of substance-induced prenatal developmental toxicity (reduced mean fetal weight, delayed ossification, rudimentary cervical ribs), but no indications for teratogenicity occurred exclusively at the high dose level, which can be interpreted as secondary effect due to maternal toxicity. At 2 and 10 mg/kg bw/day no substance-induced signs of embryo-/fetotoxicity were observed. The no observed adverse effect level (NOAEL) for maternal and prenatal developmental toxicity was 10 mg/kg bw/day.

In conclusion, chloridazon metabolite B-1 was moderately toxic after acute oral administration, it was not mutagenic nor genotoxic. The NOAEL for maternal and prenatal developmental toxicity was 10 mg/kg bw/day. The NOAEL for short-term toxicity of chloridazon metabolite B-1 was 50 mg/kg bw/day.

Based on these data and according to the EU guidance document on groundwater metabolites, both metabolites are considered toxicologically not relevant. A number of toxicological studies has been performed but a complete data package including long-term and multi-generation studies is lacking. Therefore, a higher safety factor of 1000 has to be applied when an ADI for these metabolites is derived on the basis of toxicological data obtained with the parent compound. Assuming a daily intake of 2 L water, a bodyweight of 70 kg and a 10 % contribution of drinking water to the whole daily exposure, a maximum groundwater concentration of up to 35 µg/L for the metabolites B and B1 would be acceptable. However,

as stated in the guidance document, a pragmatic limit value of 10 µg/L should not be exceeded. If this would happen, regulatory decisions must be taken on Member state level.

The results of the pharmacology testing of chloridazon can be summarised as follows:

The effect of chloridazon on the vegetative nervous system *in vitro* is predominantly parasympathicomimetic. This is suggested by the acetylcholine like effects on the isolated ileum, which could be inhibited by atropine. There were no effects on the intravasal and cardiovascular systems.

Other test substance related changes were less specific, contradictory, observed at toxic dose levels or at very high *in vitro* concentrations only.

Chloridazon did not induce pathological changes to the EEC at any dose level. There was a dose related prolongation of the waking phase in the EEC without stimulation of motor activity. These changes may be attributable to a cholinergic effect of the test substance.

2.3.1.9 Human Data

The personnel handling chloridazon in manufacturing, research and formulation is observed regularly by medical examinations. However, this surveillance program is not aimed at specifically detecting chloridazon-related symptoms or diseases. Thus, no adverse effects on health have been observed which could be related to an exposure to chloridazon.
A few cases of irritation of skin and eyes were reported in the published literature. One case of sensitisation with allergic contact dermatitis and a positive patch-test was observed. There was no positive patch-test reaction in 149 tested persons (40 of them worked as farmers). No poisoning incidents were reported in the published literature.
No observations regarding health effects after exposure of the general public are known. Methods for determination of active substance or metabolites in biological fluids are not established. Specific signs of poisoning or clinical test are not known.
See safety data sheet/precautions, symptomatic and supportive treatment, no specific antidote known.

2.3.2 ADI

For the determination of the acceptable daily intake (ADI), the results of the long-term administration studies as well as those from reproduction toxicity have the greatest relevance.

The relevant NOAELs obtained in long-term studies are shown in the table below.

Table B.2.3-4: Chronic NOAELs in mg/kg bw/day

Study	Males	Females
12 month feeding dog	11	11
long-term feeding rats	13	18
long term feeding mouse	134	158
2-generation feeding rat	37	37

The NOAEL derived from the long-term study in rats (13 mg/kg bw/day for males and 18 mg/kg bw/day for females) is lower than any of the other long-term studies. However, the

NOAEL for maternal toxicity in the prenatal toxicity study in rats was slightly lower with 10 mg/kg bw. As the LOEL in this particular study was 50 mg/kg bw/day and as at this dose level only marginal signs of toxicity were observed, the NOAEL from the long-term study in rats of 13 mg/kg bw should be used for the calculation of the acceptable daily intake (ADI). The value is rounded according to the rules to 10 mg/kg bw/day.

Chloridazon has no genotoxic potential, is not teratogenic, has no effects on fertility and is not neurotoxic. Chloridazon is not carcinogenic in any species tested.

A full toxicology database, evaluating all toxicity endpoints required, was developed for chloridazon. Clear no effect levels have been determined for all treatment related effects.

Using the conventional safety factor of 100, the proposed ADI is 0.1 mg/kg bw.

2.3.3 AOEL(systemic)

For the calculation of the acceptable operator exposure level (AOEL) and a risk assessment made thereof, the NOAELs of short-term toxicity studies as well as reproduction/ developmental toxicity studies will be taken into account.

The AOEL relevant NOAELs are listed below.

Table B.2.3-5: NOAELs from AOEL relevant studies in different species (mg/kg bw/day)

Species	Route	Males	Females
Rat	oral – 4 weeks	40	40
Dog	oral – 4 weeks	81.9	81.9
Rat	oral – 3 months	21	23.5
Mouse	oral – 3 months	65	467
Dog	oral – 3 months	97	97
Rat	dermal – 3 weeks	1.000	1.000
Mouse	pre-, peri, postnatal	-	905
Rat	2-generation study	37	37
Rat	prenatal toxicity study	-	10
Rabbit	prenatal toxicity study	-	55

The apparently lowest NOAEL of 10 mg/kg bw/day was observed in a prenatal toxicity study in rats, based on only marginal signs of maternal toxicity at the next higher dose level of 50 mg/kg bw: slightly reduced food consumption as well as a marginal impairment of body weight gain at the start of the treatment period (days 6 – 8 post coitum).

The applicant suggests that since these effects at 50 mg/kg bw were marginal, the NOAEL of 10 mg/kg bw/day should not be used for the AOEL determination. Instead the NOAEL of 17 mg/kg bw/day derived from a long-term feeding study in rats should be used for the calculation of the AOEL. The applicant considers this approach acceptable as the NOAEL in this study is still clearly below the LOAEL of the prenatal toxicity study in rats (50 mg/kg bw/day).

However, the rapporteur considers it more appropriate to use the NOAEL of 21 mg/kg bw from the 3 month rat study.

Taking into account a bioavailability of 100 %, and the safety factor of 100, the systemic acceptable operator exposure level is calculated to be 0.2 mg/kg bw/day.

2.3.4 ARfD (acute reference dose)

Chloridazon is of low acute oral, dermal and inhalation toxicity. After single oral dosing mortalities were only observed in several studies starting at dose levels of approximately 1000 mg/kg bw and higher. Under the conditions of the rules of good agricultural practice the risk of an acute intoxication by chloridazon can be ruled out. No acute effects have been observed after single exposure in repeat-dose studies. Considering the low acute toxicity of the active substance and its use patterns, the establishment of an acute reference dose is not considered necessary.

2.3.5 Drinking water limit

The determination of a MAC value is not necessary, because according to Directive 91/414/EC only the ADI and AOEL values have to be determined. Therefore, the establishment of a maximum admissible concentration for drinking water from an ADI value is not yet confirmed by a harmonised EU proposal. In addition to that, the maximum admissible concentration of an active substance is 0.1 µg/L, as established by the Directive 89/778/EEC.

2.3.6 Impact on human or animal health arising from exposure to the active substance or to impurities contained in it

According to the toxicological properties of chloridazon, harmful effects on the health of operators, bystanders, workers or consumers are not to be expected if the plant protection product is used in accordance with good plant protection practice.

The potential operator exposure was estimated for the intended use. On the basis of the German model without PPE, the estimated systemic exposure to chloridazon accounts for up to 63 % of the proposed AOEL (0.2 mg/kg bw/d). By wearing of gloves, the exposure can be reduced to a value which would result in 28 % of the proposed AOEL. In the calculation on the basis of the UK-POEM without PPE, the exposure exceeds the systemic AOEL (1053 %). However, if gloves are worn during mixing/loading and application, the exposure can be reduced to 35 % of the proposed AOEL. Altogether, the estimated operator exposure does not present an undue risk. In view of a single rather than a repeated scenario as it is the situation of field applicators, it is not likely that the potential exposure of bystanders will exceed the AOEL.

The active substance intake by consumers was estimated according to the BBA guideline. The theoretical maximum daily intake (TMDI) accounted for only a part of the ADI which represents a large margin of safety for consumers.

In view of the recommended uses and application techniques, harmful effects on the health of domestic or wild animals are not to be expected.

2.4 Residues

2.4.1 Definition of the residues relevant to MRLs

Plant matrices:

Metabolism studies were performed in the crop category 'root crops' with the crop: sugar beet. Based on the facts presented the following definitions of relevant residues are proposed for MRL setting and dietary risk assessment in root crops:

Residue definition for monitoring:	Chloridazon and metabolite B, expressed as chloridazon equivalents
Residue definition for risk assessment:	Chloridazon and its metabolites A and B, expressed as chloridazon equivalents

If chloridazon is intended to use on other crops than root crops, further studies are required to set a residue definition for all plant matrices.

Animal matrices:

The soil metabolite B was identified as main residue in plants and feeding stuff. In metabolism studies on lactating goats and laying hens no further transformation of the substance was observed. Based on this data the residue definition for animal products is proposed as:

Residue definition for monitoring:	Metabolite B, expressed as chloridazon equivalents

The proposed definition of the relevant residue for risk assessment includes metabolite B of chloridazon, as residues of metabolite B in crops were often higher than the residues of parent compound. Since this metabolite does not occur in rats or livestock, separate livestock metabolism studies had been performed, which showed that metabolite B does not undergo metabolic transformation and remains unchanged. The N-glucoside of chloridazon, metabolite A, which is the other relevant plant metabolite, is cleaved in animals and thus considered as being equivalent to the parent compound.

Residue definition for risk assessment:	Sum of chloridazon and metabolite B, expressed as chloridazon equivalents

In the livestock metabolism studies a large amount of dechlorinated chloridazon was found mainly in the muscle and in the liver of lactating goats. The substance was not identified in the rat metabolism study. Nevertheless, the rat metabolism indicates, that dechlorinated chloridazon occurs as an intermediate product. The polarity of the metabolite is higher than the parent substance. Additionally, in animal products no residues of dechlorinated chloridazon above the limit of quantification have to be expected. An inclusion of dechlorinated chloridazon in the residue definition is not considered necessary.

2.4.2 Residues relevant to consumer safety

Metabolism, distribution and expression of residues in plants

The metabolism on plants was investigated with the ^{14}C-labelled active substance in sugar beets. Chloridazon was used was in pre- and post-emergence application with a rate 2 kg as/ha up to 5 kg as/ha.

In the pre-emergence application the active substance was found only in minor parts to the total amount of residues. In the first trial metabolite A (glucose-chloridazon) and in the second one the soil metabolite B formed the main residue with an amount of 60 % each.
The post-emergence application showed only little transformation of the active substance. The amount of unchanged chloridazon in both trials counted over 75 % of the total residue.

Two metabolic pathways for chloridazon in plants are proposed:
- glucosidation of chloridazon to glucose-chloridazon (metabolite A)
- glucosidation of the soil metabolite B

Metabolism, distribution and expression of residues in livestock

The metabolism in livestock animals was investigated in lactating goats and laying hens. The metabolic pathway is comparable in both species. The following biotransformation were observed:
- dechlorination of chloridazon
- hydroxylation of the phenyl ring in para-position
- conjugation of para-hydroxy-chloridazon with sulfat

Residues resulting form supervised trials

In total, 24 trials on sugar beets, 6 trials on red beets and 8 trials on onions were performed with an rate of 2.6 kg as/ha as pre-emergence application. At harvest the following residues could be found:

Residues in sugar beet roots after 98 to 183 days:
<0.13(13), 0.13(7), 0.14, 0.16, 0.18, 0.20 mg/kg chloridazon/metabolite A + metabolite B, calculated as chloridazon
STMR: 0.13 mg/kg HR: 0.20 mg/kg

Residues in red beet roots after 93 days:
<0.13, 0.14, 0.16(3), 0.19 mg/kg chloridazon/metabolite A + metabolite B, calculated as chloridazon
STMR: 0.16 mg/kg HR: 0.19 mg/kg

Residues in onion bulbs after 78 to 122 days:
<0.13(3), 0.14 mg/kg chloridazon/metabolite A + metabolite B, calculated as chloridazon
STMR: 0.13 mg/kg HR: 0.14 mg/kg

Residues in onion bulbs after 108 to 146 days:
<0.13(4) mg/kg chloridazon + metabolite B, calculated as chloridazon
STMR: 0.13 mg/kg HR: 0.13 mg/kg

Residues in red beet tops after 93 days:
0.62, 0.76, 0.86, 1.2, 1.4, 1.5 mg/kg chloridazon/metabolite A + metabolite B, calculated as chloridazon
STMR: 1.03 mg/kg HR: 1.5 mg/kg

Storage stability

The freezer storage stability at < -5 °C of chloridazon, glucose-chloridazon (metabolite A) and the soil metabolite B was investigated over a period of at least 24 months. In the matrices

sugar beet root, sugar beet top, refined sugar, molasses and dried pulp no significant instability of residues (< 70 %) was observed.

Effects of industrial processing and/or household preparation

The effect of degradation during industrial processing was investigated for chloridazon and the soil metabolite B. Test solutions of both substances were sealed and treated under conditions, that simulate the processes of pasteurisation, baking and cooking. Any decrease or transformation of the residues could no be observed.
The effect on the residue level by industrial could not be quantified, because the residue level in the raw agricultural commodity were below the LOQ.

Livestock feeding studies

Livestock feeding studies were performed on lactating cows with chloridazon and metabolite B for 28 days. A plateau of the residue levels was reached during the second week of treatment. At 1x dosage level no residues above the LOQ were found in animal matrices, except on value in the liver. An accumulation of the chloridazon and its metabolites could not be observed.

Residues on succeeding or rotational crops

In the studies it could be shown, that residues above the limit of quantification may occur in succeeding crops after the pre-emergence application of chloridazon. In the field trials the application rate was approximately 1.5x of the intended use. In succeeding cereals, the residue levels exceeded 1.0 mg/kg in grain and went up to 7 mg/kg in wheat-fodder.
The results of the greenhouse trials with an application rate of 8.86 kg as/ha confirm massive uptake of the parent substance and the soil metabolite B.
Based on these studies, it can not be guaranteed that no residues above the LOQ may occur in succeeding crops.

Estimates of potential and actual dietary exposure through diet and other means

Long-term intake:
Based on the proposed MRLs and the LOQ of 0.13 mg/kg the TMDI calculation represents 5.3 % of the ADI for the German 4-6 years old girl and 4.3 % of the ADI for the adult of 60 kg body weight (WHO, 1998).
It can be concluded that the long-term intake of residues of chloridazon resulting from uses that have been considered is unlikely to present a public health concern.

Short-term intake:
Chloridazon does not represent an acute risk to consumers. Therefore, an acute reference dose is not considered necessary.

2.4.3 Residues relevant to worker safety

The product BAS 119 33 H (Pyramin WG; Pyramin DF) is normally applied at times when it is not necessary to enter crops shortly after spraying. To assess cases where re-entry is not avoidable, the worker exposure has been calculated using a model proposed by the German BBA (Hoernicke et al., 1998).

Considering both the application regimen and the estimated operator and worker exposure data for the product, re-entry operations do not present an undue risk to the worker, even if no PPE is worn.

2.4.4 Proposed EU MRLs and compliance with existing MRLs

Plant matrices:

Sugar beet:	0.3 mg/kg chloridazon and Metabolite B, expressed as chloridazon equivalents
Red beet:	0.5 mg/kg chloridazon and Metabolite B, expressed as chloridazon equivalents
Onion:	0.2 mg/kg chloridazon and Metabolite B, expressed as chloridazon equivalents
Chard:	3 mg/kg chloridazon and Metabolite B, expressed as chloridazon equivalents

Animal matrices:

All animal products:	0.1 mg/kg Metabolite B, expressed as chloridazon

In the EU there are no MRLs set above 0.5 mg/kg for chloridazon. For chard no MRLs are set in the EU.

2.4.5 Proposed EU import tolerances and compliance with existing import tolerances

No import tolerances have been applied for on EU level.

2.4.6 Basis for differences, if any, in conclusion reached having regard to established or proposed CAC MRLs

No data available.

2.5 Fate and behaviour in the environment

2.5.1 Definition of the residues relevant to the environment

Soil

According to the results presented, the parent compound BAS 119 H (chloridazon) and metabolite B are the only relevant residues for quantitation in soil.

The only metabolite occurring in significant amounts is metabolite B, which was formed in amounts up to 56 % in the aerobic soil metabolism study and was detected in all field soil dissipation studies. Metabolite B-1 did not occur in the soil metabolism study but in a soil degradation study for metabolite B as a transformation product. In all field dissipation studies metabolite B-1 was only detected around the limit of quantification (0.01 mg/kg).

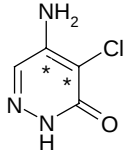
Water

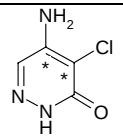
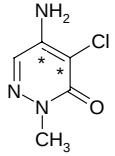
Surface water: The parent compound chloridazon and the metabolite B are the relevant residues for quantitation in surface water. Metabolite B is the only degradation product that occurred in significant amounts (up to 43 % in water/sediment systems). All photolytical transformation products occurred in amounts < 10 %.

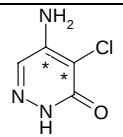
Groundwater**:** Since metabolites B and B-1 can be expected to leach to groundwater and lead to groundwater concentrations > 0.1 µg/L (lysimeter studies and FOCUS groundwater scenarios) they are to be defined as relevant residues for quantitation.

Air

Due to the low vapour pressure < 10^{-6} Pa (1×10^{-9} Pa at 20 °C) it is unlikely that chloridazon will ever reach the air, or remain for any length of time in the air, for monitoring purposes. Therefore, no residues in air can be defined.

Code	Active substance chloridazon	Soil		
Metabolites		Occurrence	Risk Assessment	
Code	Structural formula		Persistence, succeeding crops	Ecotoxicology
Metabolite B (5-amino-4-chloro-pyridazine-3-one)		aerob: 13.8 -16.9 % (120 d), 55.9 % (373 d) DT_{50}: 80 - 132 d anaerob: 8.8 % (91 d) soil photolysis: < 5 %	This metabolite is included in the residue definition for plant matrices. Even after long rotation periods diverse crops take up residues of this metabolite from soil at significant levels. These could be relevant for feed intake by domestic animals and MRL setting for food of animal origin and milk, in particular. Since the available succeeding crop studies were conducted at too long rotations the results of a new study at more realistic shorter rotation periods are announced by BASF for end of October 2004. Based on this study other MRLs for animal matrices including milk could be derived than proposed in chapter 2.4.4.	no acute and long-term effects on earthworms (TER > 10 or 5) and no effects on soil microorganisms (< 25 % deviation from control)
Metabolite B-1 (5-amino-4-chloro-2-methylpyridazine-3-one)		aerob: not detected in metabol. study $DT_{50,lab}$: 118 - 170 d soil photolysis: < 5 %	Not relevant because this metabolite was not found in succeeding crops.	no acute effects on earthworms (TER > 10) and no effects on soil microorganisms (< 25 % deviation from control)

Code	Active substance chloridazon	Ground water			
Metabolites		Occurrence	Risk Assessment		
Code	Structural formula		Pesticidal activity	Toxicology	Ecotoxicology
Metabolite B (5-amino-4-chloro-pyridazine-3-one)		lysimeter studies (annual average conc.): First study: 1 appl. with 2.6 resp. 2.96 kg as/ha: 6.6 up to 40.6 µg/L Second study: 1 appl. with 1.82 kg as/ha: 4.1 up to 12 µg/L	no herbicidal activity	Not relevant. When the ADI concept is followed, concentrations up to 35 µg/L would be acceptable. However, based on the EU guidance document, 10µg/L should not be exceeded.	effects on algae, fish and daphniae indicate that the metabolite does not have a similar or increased toxicity compared to the parent compound
Metabolite B-1 (5-amino-4-chloro-2-methylpyridazine-3-one)		lysimeter studies (annual average conc.): First study: 1 appl. with 2.6 resp. 2.96 kg as/ha: 0.1 up to 2.1 µg/L	no herbicidal activity	Not relevant. When the ADI concept is followed, concentrations up to 35 µg/L would be acceptable. However, based on the EU guidance document, 10µg/L should not be exceeded.	effects on algae, fish and daphniae indicate that the metabolite does not have a similar or increased toxicity compared to the parent compound

Code	Active substance chloridazon	Surface water and sediment	
Metabolites		Occurrence	Risk Assessment
Code	Structural formula		Ecotoxicology
Metabolite B (5-amino-4-chloro-pyridazine-3-one)		w/s-study: water: up to 43 % sediment: up to 7.3 %	effects on algae, fish and daphniae indicate that the metabolite does not have a similar or increased toxicity compared to the parent

2.5.2 Fate and behaviour in soil

Rate of degradation

From the two laboratory studies performed in compliance with current EPA resp. BBA guidelines, aerobic half-lives for chloridazon derived using ModelMaker software ranged between 8.6 days (20 °C) and 187.6 days (25 °C) and thus cover a wide spectrum. The corresponding half-lives for chloridazon normalised to reference conditions according to FOCUS are in a similar order of magnitude, ranging from 8.6 to 173.9 days with a geometric mean of 43.1 days.

For the metabolites B and B-1, half-lives derived using ModelMaker software on the basis of a best fit estimation and determined graphically, range between 80 days and 132 days, and 118 days and 170 days, respectively. Here, the covered range is smaller than for the parent substance.

Under anaerobic conditions, as expected, much longer half lives for chloridazon between 370 and 607 days were determined in the laboratory.

From the field degradation rates it is confirmed that the major metabolite B is more stable in soil than chloridazon itself, as already shown in the laboratory. For chloridazon, the DT_{50} values range between 3 and 78.5 days, and 78.5 days observed in Sweden is proposed as a realistic worst-case field half life. Chloridazon was in all trials mainly found in the top soil layers of 0 - 10 cm and 10 - 25 cm, in deeper layers the maximum recovery was 0.04 mg/kg in 61-91 cm soil depth.

Metabolite B appeared in the different trials in the top soil layers from 0-10 cm in maximum amounts of 0.448 mg/kg after 64 DAT. In this soil layer it was still found in amounts between 0.07 – 0.1 mg/kg after 6-12 months after 1 year in Sweden. At the end of the resp. studies metabolite B was detected in amounts of 0.01 mg/kg in a soil depth of 87 – 100 cm in Germany and in a depth of 91 - 122 cm in California. Although statistically unreliable, the DT_{50} values available for the metabolite B from different climatic regions (Sweden vs. California 360 vs. 130 and 217 days) indicate a retarded dissipation under field conditions when compared with those obtained under laboratory conditions.

In the field the minor metabolite B-1 is generally found only in lower quantities of max. 0.033 mg/kg in the 0 – 10 cm soil layer in some samples and mostly after longer periods of time after application. However, in Germany, 0.01 mg/kg was detected in the 87 -100 cm soil layer 100 - 188 days after application, thus demonstrating the tendency of this metabolite, as also proven for metabolite B, to move into deeper layers of soil. A calculation of field degradation rates for this metabolite was not possible.

From the results of the rate studies, it is concluded that worst-case primary degradation of chloridazon and its two metabolites in soil can be very slow. Together with the data from the route studies, chloridazon is overall assessed to be relatively persistent to non-biodegradable in soil.

Fate in soil

From the results of the two outdoor lysimeter studies, it is concluded that the application of chloridazon is safe with regard to the presence of the parent compound in groundwater. Only one measureable detection of chloridazon and yearly average concentrations far below 0.1 µg/L were determined in the lysimeter leachates.

The chloridazon metabolites B resp. metabolite B-1 have a high leaching potential. Yearly average concentrations of metabolite B exceeded 0.1 µg/L in both years with maximum concentration of 40 µg/L in the second year.

For the concentrations of the metabolites in the leachate, a dependency on the soil was observed. Whereas high concentrations of metabolite B were observed with the sandy soil

LY-SPB with the maximum concentration of 40 µg/L in the second year after application, concentrations formed with the loamy soil LY-TP were between 1.47 µg/L and 2.13 µg/L with its maximum in the first year after application. According to current guidelines the loamy sand is too conservative for an assessment of the leachate behaviour thus further evaluations are based on the results obtained with the sandy soil.
Metabolite B-1 was generally detected in much lower concentrations than metabolite B ranging between 0.08 µg/L and 0.1 µg/L in loamy soil and 0.13 µg/L and 2.12 µg/L in the sandy soil.

PEC_{gw} values of the parent active substance chloridazon did not exceed the maximum permissible concentration of 0.1 µg/L in the FOCUS scenarios except for the location Piacenza, where the simulations indicate unacceptable leaching of chloridazon to groundwater. The PEC_{gw} of the metabolites B and B-1 exceeded 0.1 µg/L in all scenarios in accordance with the observations in the lysimeter studies.
These concentrations are expected to be of no ecological concern, since the compounds are of no ecotoxicological relevance: Metabolite B and metabolite B-1 revealed no herbicidal activity higher than the parent compound in the bioassays with algae and with terrestrial plants (seedling emergence test). No adverse acute effects on fish, daphnia and algae could be observed after exposure to the metabolites.

A compilation of ground water monitoring data from water companies, private wells and official federal monitoring programmes is available in the UBA (German Federal Environmental Agency). These data are also regularly published by LAWA (Federal Working Group - Water). In agreement with the PEC groundwater calculations chloridazon can be present in groundwater. Concentrations above 0.1 µg/L were found in a minor fraction of the sampling points (0.2 - 0.34 %). However, hot spots with more than 1 µg/L chloridazon seem to be possible.

2.5.3 Fate and behaviour in water

The distribution and degradation of chloridazon was studied in two natural systems of water and sediment. Dissipation of chloridazon from the water phase is slow with first-order half-lives of 58 days (ModelMaker, version 3.0.4) and 76 days (according to Timme et al.) in one system and 105 days (ModelMaker version 3.0.4) in the second one investigated. Best fit half-lives of chloridazon for the water phase are 35 days (according to Timme et al.) for the first system resp. 66 days (interpolation from experimental data) for the second test system.
Metabolism of chloridazon is modest, only in one of the two water/sediment systems investigated an enhanced degradation of chloridazon after 60 days results in the formation of the main metabolite B in the water, accounting for 42.6 % TAR at the end of the test and which must therefore be considered as stable. No further individual metabolites were observed in significant amounts. Ultimate biodegradation was negligible with max. degrees of mineralisation up to 3 – 8 % TAR. Bound residues in the sediment reached 21 % TAR in both systems at study end.
After application of ^{14}C-chloridazon an overall comparison of the distribution of total radioactivity at study end after 100 days in both systems investigated with their corresponding systems sterilised before application of test substance results in values in a similar order of magnitude for the decline in the water phase, both sediment extractable and bound residues and carbon dioxide evolution. Thus the fate of chloridazon in the aquatic ecosystem is obviously principally governed by abiotic distribution processes with biological processes playing only a minor role.

Taking all the data available into account – slow primary degradation in the water phase, negligible ultimate degradation, moderate transformation to bound residues together with a limited metabolism - it must be concluded that chloridazon is persistent to non-biodegradable in aquatic systems.

In two monitoring studies the chloridazon surface water concentrations were in a range where no concern for the aquatic environment is expected, provided that chloridazon is regularly used in the respective areas. No information concerning the agricultural area in use treated with chloridazon were given. Though the studies provided a full areal coverage of one EU member state over one year and a large surface water catchment in the expected time of ocurrence in surface waters, the findings are not a positive proof for negligible entry of chloridazon into the aquatic environment.
However, the studies give hints that no surface water concentrations of concern may be expected, since a common use of chloridazon in the investigated catchment area can be assumed.

Predicted environmental concentrations of chloridazon in surface water (PEC_{sw}) and sediment (PEC_{sed}) resulting from pre-emergence spray application of chloridazon (1 x 2.6 kg as/ha) on sugar beet fields were calculated by the RMS using the STEP 1-3 approach of the European surface water assessment of Plant Protection Products (FOCUS, 2001). Simulations were run using the tool FOCUS SWASH 1.1 and European surface water scenarios as proposed by FOCUS (2001). In these 6 scenarios, different entry routes of the substance into surface water like spray drift, run-off and drainage are considered.
At STEP 3, the initial PEC of chloridazon in surface water (i.e. global maximum concentration) ranged from 1.332 to 130.9 µg/L. The initial PEC of chloridazon in sediment ranged from 4.340 to 27.61 µg/kg dry sediment. The actual and time weighted average exposure concentrations for all use scenarios were also calculated.
The worst case global maximum concentrations for chloridazon in the water phase are 130.87 µg/L (scenario R3, stream) and 13.62 µg/L (scenario D3, ditch), respectively. The worst case global maximum concentrations for chloridazon in sediment are 27.61 µg/kg (scenario R3, stream) and 10.73 µg/kg (scenario D4, pond), respectively.
The worst case global maximum concentrations for metabolite B in the water phase are 28.57 µg/L (scenario D4, pond) and 2.28 µg/L (scenario R3, stream), respectively. The worst case global maximum concentrations for metabolite B in sediment are 81.58 µg/kg (scenario D4, pond) and 0.35 µg/kg (scenario R3, stream), respectively.

2.5.4 Fate and behaviour in air

Less than 4 % of chloridazon volatilise within 24 hours after application both from soil and plant surface, which is within the precision range of the experiment. Considering these experimental results, the relatively high water solubility and the low vapour pressure (1×10^{-9} Pa at 20 °C) it can be concluded that the active substance has no tendency to enter the air.
For the degradation rate in the troposphere resulting from OH-attack, QSAR estimates according to the Atkinson method yielded a half life < 7.0 h.

2.6 Effects on non-target species

2.6.1 Effects on terrestrial vertebrates

2.6.1.1 Effects on birds

The formulation BAS 119 33 H is a herbicidal product, which contains the active substance chloridazon (BAS 119 H) with a nominal content of 650 g/L. The recommended use pattern for BAS 119 33 H includes one application per season in beet crops at pre-emergence and/or early post-emergence up to BBCH 19 (weeds should not exceed BBCH 14-16) with a single application rate of 4.0 L/ha BAS 119 33 H corresponding to 2.6 kg/ha chloridazon.
For the assessment of effects of chloridazon on birds, tests with bobwhite quail (*Colinus virginianus*) and mallard (*Anas platyrhynchos*) have been conducted. The results are summarised in Table 2.6-1.

Table 2.6-1: Summary of effects of chloridazon on birds

Test species	Test system	Results	
		mg as/kg feed	mg as/kg bw
Colinus virginianus	acute oral toxicity		LD_{50} > 2000 NOEL = 1000
Colinus virginianus	short-term dietary toxicity	LC_{50} > 5000 NOEC = 625	LC_{50} > 1318 *
Anas platyrhynchos	short-term dietary toxicity	LC_{50} = 4260 NOEC = 625	LC_{50} = 1601 *
Colinus virginianus	Sub-chronic toxicity and reproduction	NOAEL = 300	NOEC = 21.5 *

*) daily dose (mg/kg bw/day) calculated based on study data.

The risk assessment is based on one application of 4 L product/ha in sugar beets at early post-emergence leading to 2600 g active substance/ha and represents the worst case scenario for the impact on birds.
The TER values for the acute and short-term exposure of herbivorous and insectivorous birds are higher than the trigger of 10 set by the Annex VI of Directive 91/414EEC for a refined risk assessment. The Tier 1 long-term exposure scenarios indicate a potential risk for herbivorous and insectivorous birds in leafy crops.
The refined exposure assessment of the Tier 2 risk assessment results in long-term TER_{lt} for birds which are higher than those in the Tier 1 assessment and higher than the trigger of 5 as laid down in Annex VI of Directive 91/414/EEC. Therefore, for birds predominantly feeding on soil invertebrates and for herbivorous birds the worst case risk assessment indicates that the risk is acceptable.
In conclusion, the acute, short-term and long-term risk for herbivorous and insectivorous birds after application of chloridazon according to good agricultural practice is acceptable.

2.6.1.2 Effects on terrestrial mammals

For the assessment of effects of chloridazon on mammals, tests with rats and mice have been evaluated. The acute oral toxicity of the formulation (BAS 119 33 H) was investigated with rats and of the active substance (BAS 119 H) with rats and mice. The data generated with the

formulation are comparable to the results of the active substance. Since the product is applied by spraying, the test results obtained with the active substance are relevant for the risk assessment. The most sensitive ecologically relevant endpoints of the acute, short-term and long-term toxicity studies used for the risk assessment are summarised in the following table (Table 2.6-2).

Note: From about the mid of the 1980's on an isomer reduced form of chloridazon (BAS 119 H) with higher purity and containing a lower amount of the herbicidally inactive isomer iso-chloridazon could be provided. Several studies were performed to prove that these two different purities do not differ in their toxicological profile.

Table 2.6-2: Acute and long-term toxicity of chloridazon

Species	Study type	Test substance	mg/kg bw/d	
			males	**females**
Rat	acute, oral LD_{50}	chloridazon	> 3830	2140
			maternal toxicity	**developmental toxicity**
Rat	long-term, 2-generation study NOAEL	chloridazon	37; 148 fertility	37

The risk assessment is based on the Guidance Documents (SANCO/4145/2000; SANCO/10329/2002) and is focused on the acute and long-term TERs for herbivorous mammals in leafy crops.
The TER_a values for acute exposure in leafy plants are higher than the trigger of 10 set by Annex VI of Directive 91/414 EEC for a refined risk assessment. The long-term exposure scenarios indicate a potential risk for herbivorous mammals in cereals and in leafy crops. The TER_{lt} values are below the trigger of 5 and need to be refined. The refinement of the exposure was performed for the relevant medium herbivorous species (hare, *Lepus europaeus*) since small herbivorous mammals will not inhabit beet crops which provided no shelter for the animals.
The Tier 2 exposure assessment, based on conservative assumptions, results in long-term TER_{lt} for mammals, which are higher than those in the Tier 1 assessment and also higher than the trigger of 5 set by the Annex VI of Directive 91/414 EEC.
In conclusion, the acute and long-term risk for terrestrial mammals feeding on crop after application of chloridazon according to good agricultural practice is acceptable.

Two metabolites of chloridazon were found in sugar beets with > 10 % TRR (major metabolites). The glycoside metabolite A is metabolised in animals into the parent chloridazon and thus is covered by the toxicological data on chloridazon. Metabolite B is less toxic than chloridazon and thus is covered by the risk assessment for the parent compound. The risk assessment for the parent molecule chloridazon would hence cover the potential risk from these major metabolites.
Due to the low lipophilicity of the active substance chloridazon ($logP_{ow}$ < 1.2) it is concluded that there is no risk of bioaccumulation in food chains. In addition, chloridazon was rapidly and almost completely excreted from rats and lactating goats, and there was no indication of accumulation of chloridazon in tissues, organs or goat milk. It is thus concluded that the application of BAS 119 33 H in sugar beets does not give rise for concern of an accumulation of the active substance chloridazon in the food chain or for concern of secondary poisoning.

Therefore, it can be concluded that the application of the product BAS 119 33 H according to good agricultural practice will not adversely affect wild mammal populations under natural conditions.

2.6.2 Effects on aquatic species

As expected for a herbicide, effects on aquatic plants were more pronounced. The active substance chloridazon is very toxic for algae based on biomass inhibition. The biomass EC_{50} of the active substance was determined using the green algae *Pseudokirchneriella subcapitata* with 0.6 mg/L and was the lowest EC50 value. The EC_{50} for inhibition of growth rate related to the active substance was found to be 2.6 mg as/L. Since chloridazon is used as a herbicide, additional tests with an algal species from a different taxonomic group and with aquatic macrophytes are needed. The sensitivity of these organisms was comparable or slightly smaller compared to *Pseudokirchneriella subcapitata.* Fish and daphnids are less sensitive than algae at acute exposure, based on their LC_{50} and EC_{50} of 41.3 and 132 mg as/L, respectively. Therefore, the product can be classified as toxic to aquatic organisms. The acute toxicity of the formulation is in the concentration range as expected from the active substance content. The LC_{50} for fish and EC_{50} for daphnia are 323 and 52 mg as/L, respectively. Regarding daphnia toxicity, the factor of 2.5 is in the range of normal laboratory variation.

Chronic studies on fish and daphnia were performed with the active substance. The NOEC for juvenile growth of 3.16 mg as/L was the most sensitive endpoint, besides the NOEC for biomass of the 72 h algae growth inhibition test and effects on *Lemna gibba* both with 0.1 mg as/L.

The intended application pattern of BAS 119 33 H in the EU includes one application with 4.0 kg BAS 119 33 H/ha corresponding to 2.6 kg/ha chloridazon pre-emergence or up to three applications post-emergence with a total of up to 2.6 kg as/ha cumulative. The single application with the full rate constitutes the worst case with respect to potential surface water contamination.

The TER values using the STEP 3 approach of the European surface water assessment of Plant Protection Products (FOCUS, 2001) for PEC_{sw} calculations demonstrate a safe use of chloridazon in 5 out of 6 locations regarding 1 annual application with 2.6 kg as/ha pre-emergence in sugar beet fields.
The acute and long-term TER values for daphnids and fish meet the standard triggers of Directive 91/414/EEC considering spray applications and drainage or run-off of chloridazon according to the FOCUS scenarios. The data indicate a potential risk only for algae at the stream location R3.
The contamination of estuarine and marine environments is considered to be minimal compared to freshwater habitats adjacent to agricultural land according to the use pattern, the potential route of contamination and dissipation of the compound.

According to the national approach of the German Federal Environmental Agency for calculating PEC_{sw} values which distinguishes between the different routes of entry (spray drift, run-off and drainage), a safe use could be demonstrated considering spray application in a distance of 1 m to shallow surface water ($PEC_{sw\ ini}$ spray drift 24.01 µg as/L, run-off 48.69 µg as/L, drainage 7.91 µg as/L).

Metabolites

The main metabolite (metabolite B) proved to be of low acute toxicity to fish, daphnia and algae with EC_{50} values > 100 mg/L. The minor metabolite B-1 is also of low toxicity to fish and daphnia (EC/LC_{50} > 100 mg/L), however, the E_bC_{50} of 18.6 mg/L indicates that metabolite B-1 is harmful to algae.
In the submitted water/sediment study the parent compound BAS 119 H and metabolite B are the relevant residues, which appeared in concentrations up to 43 % in the water but only up to 7 % in the sediment. However, tests with water organisms showed that the metabolite is of clearly lower toxicity than the parent compound and can be considered to be ecotoxicologically non-relevant.

The TER_a of metabolite B values obtained by using the STEP 3 approach of the European surface water assessment of Plant Protection Products (FOCUS, 2001) for PEC_{sw} calculations meet the respective trigger values indicating an acceptable risk for exposed aquatic organisms during exposure to metabolite B after application of 2.6 kg chloridazon/ha pre-emergence in sugar beet fields.

2.6.3 Effects on bees and other arthropod species

2.6.3.1 Effects on bees

As chloridazon containing products can be sprayed during the vegetation season, honey bees might be exposed to the spraydrift directly or to contaminated food sources (nectar and pollen). Therefore, results from laboratory testing with honey bees have been provided, one with the active substance and one with the formulated product. All results show, that chloridazon is of low contact and oral toxicity and all hazard quotients are clearly below the trigger of 50. Therefore, it can be concluded that honey bees will not be put at risk by the practical use of chloridazon containing products.

2.6.3.2 Effects on other arthropod species

To assess the effects of BAS 119 33 H on terrestrial arthropods other than bees, five different arthropod taxa were tested in the laboratory (*Typhlodromus pyri, Aphidius rhopalosiphi, Chrysoperla carnea, Pardosa* sp. and *Aleochara bilineata*). These non-target arthropod species were chosen according to the recommendations of ESCORT II (Candolfi et al., 2001, see SANCO/10329/2002), representing different ecological groups. The tests cover laboratory trials with exposure on inert substrate.
The rate tested in the worst case laboratory studies was equivalent to the maximum single application rate of 4.0 kg product/ha for *T. pyri* and *A. rhopalosiphi.* The 1.5-fold maximum single application rate was applied for *C. carnea*, *A. bilineata* and *P.* spec. There were no effects on mortality and reproduction in the tests with *A. rhopalosiphi, A. bilineata, C. carnea* and *P.* spec. At the highest test concentration of 4 L/ha 36.8 % mortality and 43.6 % reduced reproduction were observed with *T. pyri*.

The recommended use pattern for BAS 119 33 H includes one application per season in beets with application rates of 1 x 4.0 kg BAS 119 33 H/ha, corresponding to 2.6 kg chloridazon/ha. The risk assessment is performed according to the Guidance Document on Terrestrial Ecotoxicology (SANCO/10329/2002) for the standard tests on inert substrates (Tier I) based on the hazard quotients (HQ). Additionally, the risk assessment for off-crop

scenario is performed according to the TER approach as applied at the German Federal Environmental Agency (Schulte et al. 1999).

The hazard quotients based on standard tests were ≤ 1 and the data obtained indicate that no risk or unacceptable effects on non-target arthropods including soil dwelling predators will be anticipated for in-crop and off-crop scenarios.

In the TER approach the LR_{50} values of the standard toxicity tests are compared with the exposure concentration expected in 1 m distance from the field (22.2 g/ha). All obtained toxicity exposure ratios are clearly above the trigger of 10 indicating no need for extended studies and an acceptable risk for non-target insects including soil dwelling predators off-crop.

In conclusion: On account of the laboratory studies carried out and based on the respective assessment schemes, no risk or unacceptable effects from the use of BAS 119 33 H according to good agricultural practice will be anticipated for non-target arthropods other than bees assuming in-crop and off-crop exposure scenarios.

2.6.4 Effects on earthworms and other soil macro-organisms

The acute toxicity of chloridazon and its soil metabolites B and B-1 as well as the formulation have been tested on earthworms in 14-day toxicity studies with up to 1132 mg/kg substrate. Chloridazon and the formulated product BAS 119 33 H exhibited no intrinsic toxicity to earthworms (LC_{50} = >1000 mg as/kg; NOEC = 1000 mg as/kg). The soil metabolites B and B-1 were practically non-toxic to earthworms with LC_{50}-values of >1132 mg/kg and >1000 mg/kg and NOEC-values of 1132 mg/kg and 1000 mg/kg substrate, respectively.
The risk assessment for earthworms is based on PEC-calculations using realistic exposure scenario in sugar beets (1 x 4.0 kg BAS 119 33 H/ha, 0 % interception). The acute TER values for chloridazon and the metabolites B and B-1 as well as for the lead formulation BAS 119 33 H are above the 91/414 EEC Annex VI trigger value of 10 indicating no potential acute risk to earthworms.
Investigation of sublethal effects of chloridazon is not triggered. Metabolite B appeared to be more persistent in soils than the parent compound and degraded with $DT_{50field}$-values ranging from 130 to 360 days. It can be assumed that $DT_{90\ field}$ are > 365 days. In a 56-day reproduction study on earthworm (*Eisenia fetida*) with BH 119-Metabolite B the NOEC was determined to be 15.0 mg/kg soil dry weight, the highest concentration tested. The long-term TER value for the metabolites B is above the 91/414 EEC Annex VI trigger value of 5 indicating no potential long-term risk to earthworms. Metabolite B-1 was found in field studies only in minor amounts and only at a few samplings. This metabolite is regarded as not relevant in the terrestrial compartment. No additional study was needed.
Based on the data available and the risk assessment it is concluded that earthworms will not be affected provided chloridazon or BAS 119 33 H are applied according to good agricultural practice.

2.6.5 Effects on soil micro-organisms

Laboratory studies on the influence of BAS 119 33 H on non-target soil micro-organisms, i.e. nitrogen transformation and carbon transformation, tested in two field soils, did not exhibit adverse effects at test concentrations of 3 and 30 kg BAS 119 33 H/ha (i.e.: 2.6 kg as/ha and

26 kg as/ha corresponding to 75 % of the max. yearly recommended application rate of 4.0 kg/ha and its 7.5-fold rate).
All deviations compared to the control within the test period of 28 days were < 25 %. It is therefore concluded that the use of BAS 119 33 H according to good agricultural practice will not adversely affect ecosystem functions driven by soil micro-organisms.

Furthermore, the soil metabolites of BAS 119 H, metabolite B and metabolite B-1 have been tested at concentrations which reflect the maximum transformation rates of the active substance into the respective metabolite in the soil, i.e. 50 % (metabolite B, no molecular correction factor) and 10 % (metabolite B-1, no molecular correction factor) on the basis of the maximum single field application rate of 2.6 kg as/ha. The results show that the tested soil metabolites also have no adverse effects on soil micro-organisms and their physiological activities. The deviations compared to the control within the test period of 28 days are by far < 25 %.

2.6.6 Effects on other non-target organisms (flora and fauna)

Application of BAS 1109 33 H via spraying on soil and plant surfaces is of low toxicity to the tested plants and resulted in ER_{50} for plant biomass > 6000 g/ha (spraying on soil) and between 4781 and > 6000 g/ha (spraying on plants), respectively. Oilseed rape was the most sensitive species in both test systems with highest susceptibility observed after post-emergence spraying. The NOER for plant weight was found to be equivalent to 3924 g as/ha or 981 g as/ha, respectively.
To assess the risk of non-target plants outside the treated area the effects observed in the standard plants of the OECD guideline after application of BAS 119 33 H by spraying on soil surface or plants were used in accordance with the intended use. The TER for the most sensitive plant species was calculated to be 53 and is higher than the trigger of 10.
Based on reasons given in this risk assessment, it can be concluded that the risk for populations of terrestrial non-target plants is acceptable if BAS 119 33 H is applied at rates up to 4.0 kg BAS 119 33 H/ha according to good agricultural practice.

With respect to the herbicidal activity of the metabolites B and B-1 data on a seedling emergence test on 8 species are available at the RMS. The data indicate that both metabolites do not show a herbicidal activity up to 2000 g as resp. g metabolite.

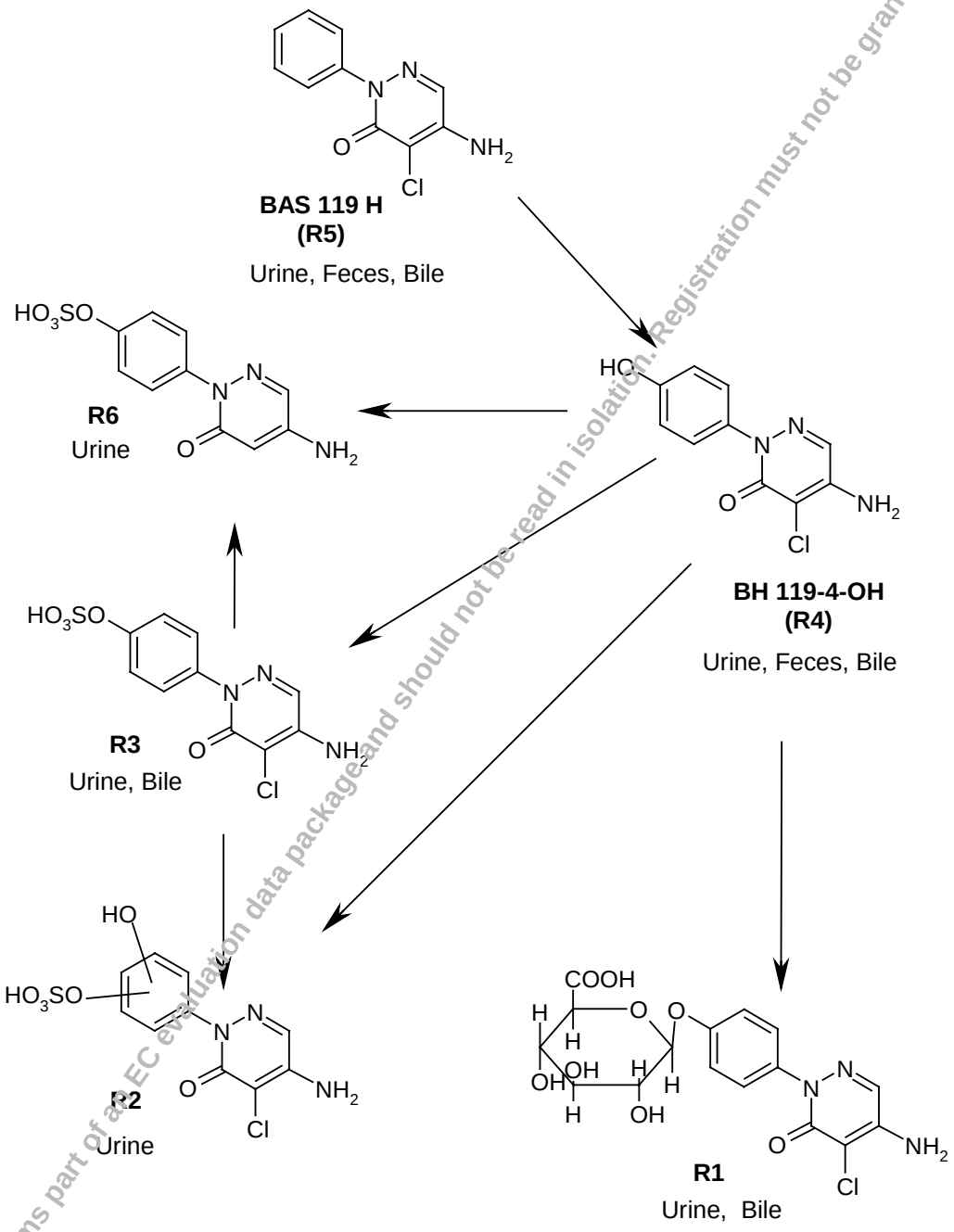
2.6.7 Effects on biological methods of sewage treatment

In the laboratory study on inhibition of oxygen consumption by activated sludge the NOEC was found to be 500 mg as/L indicating a low risk for disturbance of sewage treatment processes. It is expected that the small chloridazon water concentrations cannot affect water treatment procedures. Therefore, no data regarding the impact of chloridazon on water treatment procedures have been generated.

2.7 Overall conclusion (metabolism schemes)

2.7.1 Toxicology (laboratory animals)

Figure 2.7-1: Proposed metabolic pathway of chloridazon in rats



2.7.2 Residues (plant, plant products, livestock animals)

Figure 2.7-2: Proposed metabolic pattern of chloridazon in sugar beets

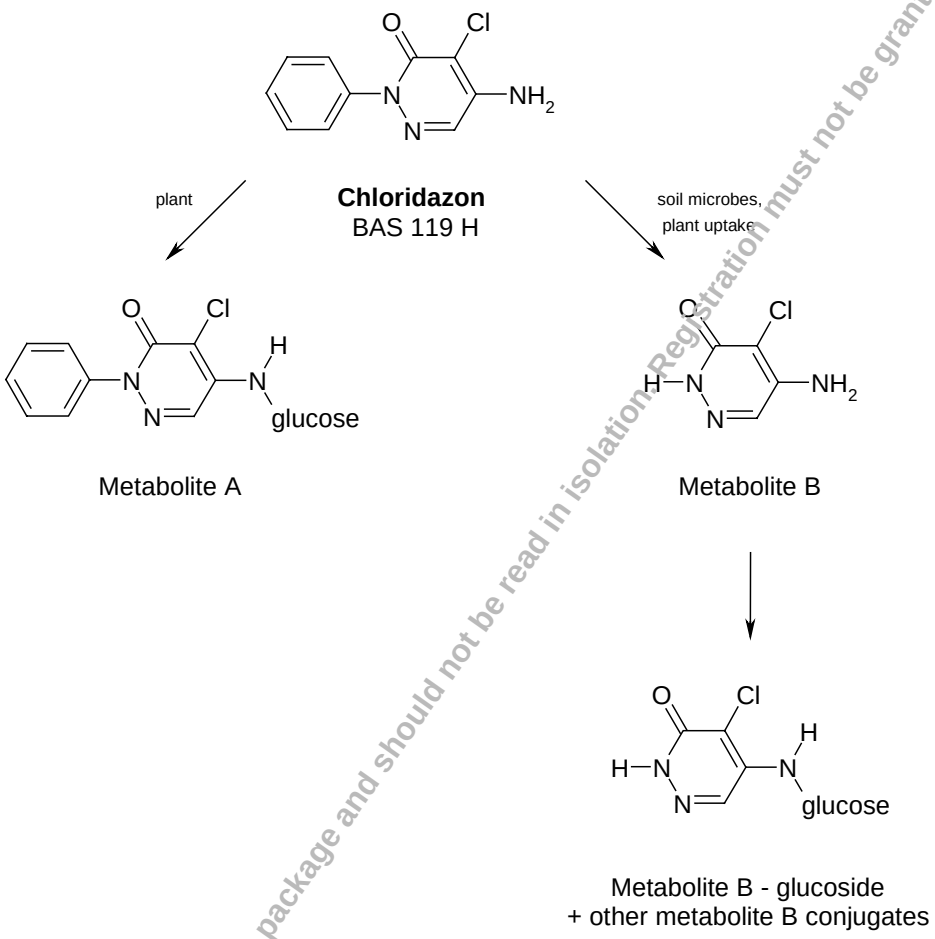
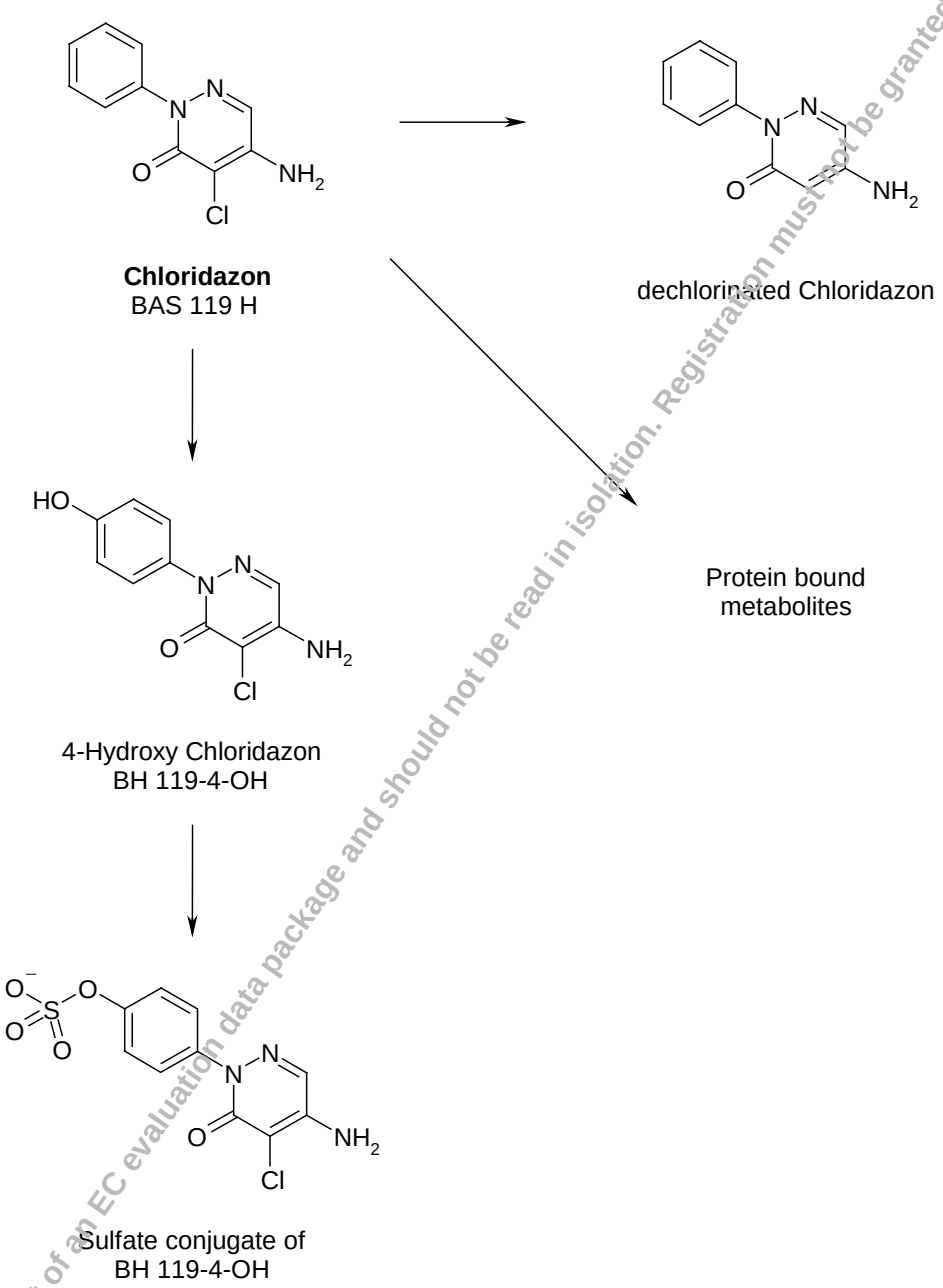


Figure 2.7-3: Proposed metabolic pattern of chloridazon in lactating goats and laying hens



2.7.3 Fate and behaviour in the environment (soil, water, air)

Figure 2.7-4: Proposed aerobic degradation pathway of chloridazon in soil

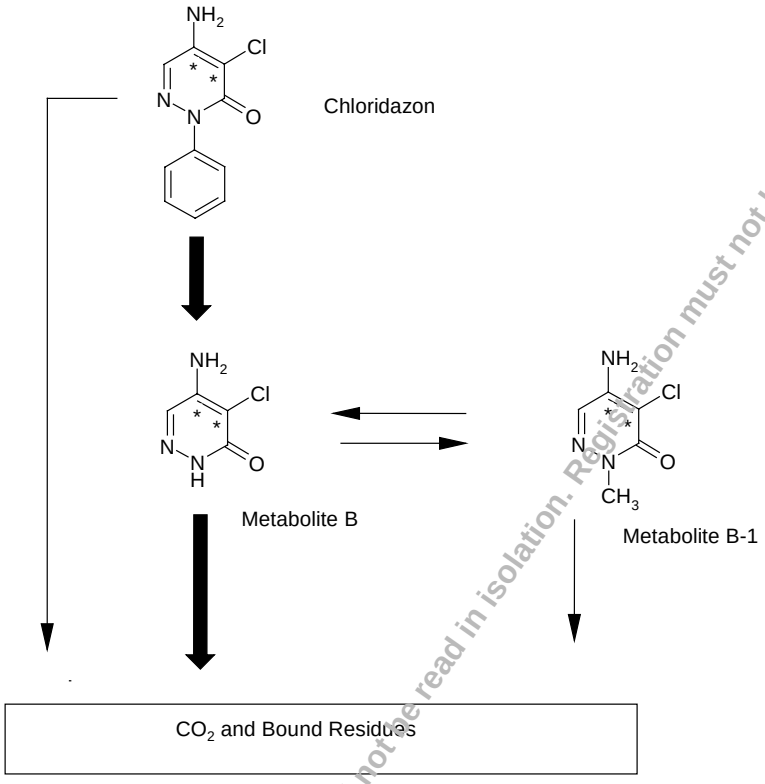
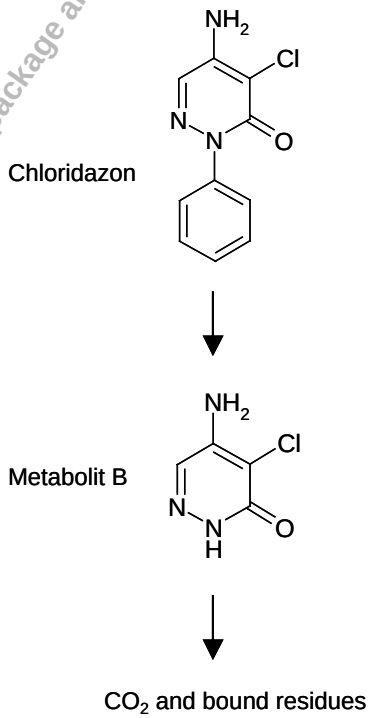


Figure 2.7-5: Proposed route of degradation of chloridazon in water/sediment



Degradation in air: not relevant

Appendix 1

Chloridazon

Standard Terms and Abbreviations

2.8 Appendices

2.8.1 Appendix I: Standard terms and abbreviations

Part 1 Technical Terms

A	ampere
ACH	acetylcholine
AChE	acetylcholinesterase
ADI	acceptable daily intake
ADP	adenosine diphosphate
AE	acid equivalent
AFID	alkali flame-ionisation detector or detection
A/G	albumin/globulin ratio
ai	active ingredient
ALD_{50}	approximate median lethal dose, 50 %
ALT	alanine amitrotransferase (SGPT)
AMD	automatic multiple development
ANOVA	analysis of variance
AOEL	acceptable operator exposure level
AP	alkaline phosphatase
approx	approximate
AR	applied radioactivity
ARC	anticipated residue contribution
ARfD	acute reference dose
as	active substance
AST	aspartate aminotransferase (SGOT)
ASV	air saturation value
ATP	adenosine triphosphate
BCF	bioconcentration factor
bfa	body fluid assay
BOD	biological oxygen demand
bp	boiling point
BSAF	biota-sediment accumulation factor
BSE	bovine spongiform encephalopathy
BSP	bromosulfophthalein
Bt	*Bacillus thuringiensis*
Bti	*Bacillus thuringiensis israelensis*
Btk	*Bacillus thuringiensis kurstaki*
Btt	*Bacillus thuringiensis tenebrionis*
BUN	blood urea nitrogen
bw	body weight
c	centi- (x 10^{-2})
°C	degree Celsius (centigrade)
CA	controlled atmosphere
CAD	computer aided design

CADDY	computer aided dossier and data supply (an electronic dossier interchange and archiving format)
cd	candela
CDA	controlled drop(let) application
cDNA	complementary DNA
CEC	cation exchange capacity
cf	confer, compare to
CFU	colony forming units
ChE	cholinesterase
CI	confidence interval
CL	confidence limits
cm	centimetre
CNS	central nervous system
COD	chemical oxygen demand
CPK	creatinine phosphatase
cv	coefficient of variation
Cv	ceiling value
CXL	Codex Maximum Residue Limit (Codex MRL)
d	day
DAT	days after treatment
DES	diethylstilboestrol
DFR	dislodgeable foliar residue
DMSO	dimethylsulfoxide
DNA	deoxyribonucleic acid
dna	designated national authority
DO	dissolved oxygen
DOC	dissolved organic carbon
dpi	days past inoculation
DRES	dietary risk evaluation system
DT_{50}	period required for 50 percent dissipation (define method of estimation)
DT_{90}	period required for 90 percent dissipation (define method of estimation)
dw	dry weight
DWQG	drinking water quality guidelines
ε	decadic molar extinction coefficient
E_bC_{50}	effective concentration on the biomass
EC_{50}	effective concentration
ECD	electron capture detector
ECU	European currency unit
ED_{50}	median effective dose
EDI	estimated daily intake
ELISA	enzyme linked immunosorbent assay
e-mail	electronic mail
EMDI	estimated maximum daily intake
EPMA	electron probe micro analysis
ERC	environmentally relevant concentration
E_rC_{50}	effective concentration on the growth rate
ERL	extraneous residue limit
F	field
F_0	parental generation

F_1	filial generation, first
F_2	filial generation, second
FIA	fluorescence immuno assay
FID	flame ionisation detector
FOB	functional observation battery
fp	freezing point
FPD	flame photometric detector
FPLC	fast protein liquid chromatography
g	gram
G	glasshouse
GAP	good agricultural practice
GC	gas chromatography
GC-EC	gas chromatography with electron capture detector
GC-FID	gas chromatography with flame ionisation detector
GC-MS	gas chromatography-mass spectrometry
GC-MSD	gas chromatography with mass-selective detection
GEP	good experimental practice
GFP	good field practice
GGT	gamma glutamyl transferase
GI	gastro-intestinal
GIT	gastro-intestinal tract
GL	guideline level
GLC	gas liquid chromatography
GLP	good laboratory practice
GM	geometric mean
GMO	genetically modified organism
GMM	genetically modified micro-organism
GPC	gel-permeation chromatography
GPPP	good plant protection practice
GPS	global positioning system
GSH	glutathion
GV	granulose virus
h	hour(s)
H	Henry's Law constant (calculated as a unitless value) (see also K)
ha	hectare
Hb	haemoglobin
HCG	human chorionic gonadotropin
Hct	haematocrit
HDT	highest dose tested
hL	hectolitre
HEED	high energy electron diffraction
HID	helium ionisation detector
HPAEC	high performance anion exchange chromatography
HPLC	high pressure liquid chromatography or high performance liquid chromatography
HPLC-MS	high pressure liquid chromatography – mass spectrometry
HPPLC	high pressure planar liquid chromatography
HPTLC	high performance thin layer chromatography
HRGC	high resolution gas chromatography

Hs	Shannon-Weaver index
Ht	haematocrit
I	indoor
I_{50}	inhibitory dose, 50 %
IC_{50}	median immobilisation concentration
ICM	integrated crop management
ID	ionisation detector
IEDI	international estimated daily intake
IGR	insect growth regulator
im	intramuscular
inh	inhalation
ip	intraperitoneal
IPM	integrated pest management
IR	infrared
ISBN	international standard book number
ISSN	international standard serial number
iv	intravenous
IVF	in vitro fertilisation
k	kilo
K	Kelvin or Henry's Law constant (in atmospheres per cubic meter per mole) (see also H)13
K_{ads}	adsorption constant
K_{des}	apparent desorption coefficient
K_{oc}	organic carbon adsorption coefficient
K_{om}	organic matter adsorption coefficient
kg	kilogram
L	litre
LAN	local area network
LASER	light amplification by stimulated emission
LBC	loosely bound capacity
LC	liquid chromatography
LC-MS	liquid chromatography-mass spectrometry
LC_{50}	lethal concentration, median
LCA	life cycle analysis
LCLo	lethal concentration low
LC-MS-MS	liquid chromatography with tandem mass spectrometry
LD_{50}	lethal dose, median; dosis letalis media
LDLo	lethal dose low
LDH	lactate dehydrogenase
LOAEC	lowest observable adverse effect concentration
LOAEL	lowest observable adverse effect level
LOD	limit of detection
LOEC	lowest observable effect concentration
LOEL	lowest observable effect level
LOQ	limit of quantification (determination)
LPLC	low pressure liquid chromatography
LSC	liquid scintillation counting or counter
LSD	least squared denominator multiple range test
LSS	liquid scintillation spectrometry

LT	lethal threshold
m	metre
M	molar
µm	micrometer (micron)
MC	moisture content
MCH	mean corpuscular haemoglobin
MCHC	mean corpuscular haemoglobin concentration
MCV	mean corpuscular volume
MDL	method detection limit
MFO	mixed function oxidase
µg	microgram
mg	milligram
MHC	moisture holding capacity
min	minute(s)
mL	millilitre
MLT	median lethal time
MLD	minimum lethal dose
mm	millimetre
mo	month(s)
mol	Mol
MOS	margin of safety
mp	melting point
MRE	maximum residue expected
MRL	maximum residue limit or level
mRNA	messenger ribonucleic acid
MS	mass spectrometry
MSDS	material safety data sheet
MTD	maximum tolerated dose
n	normal (defining isomeric configuration)
NAEL	no adverse effect level
nd	not detected
NEDI	no effect daily intake (mg/kg body wt/day)
NEL	no effect level
NERL	no effect residue level
ng	nanogram
nm	nanometer
NMR	nuclear magnetic resonance
no	number
NOAEC	no observed adverse effect concentration
NOAEL	no observed adverse effect level
NOEC	no observed effect concentration
NOED	no observed effect dose
NOEL	no observed effect level
NOIS	notice of intent to suspend
NPD	nitrogen-phosphorus detector or detection
NPV	nuclear polyhedrosis virus
NR	not reported
NTE	neurotoxic target esterase
OC	organic carbon content

OCR	optical character recognition
ODP	ozone-depleting potential
ODS	ozone-depleting substances
OM	organic matter content
op	organophosphorus pesticide
Pa	Pascal
PAD	pulsed amperometric detection
2-PAM	2-pralidoxime
pc	paper chromatography
PC	personal computer
PCV	haematocrit (packed corpuscular volume)
PEC	predicted environmental concentration
PEC_A	predicted environmental concentration in air
PEC_S	predicted environmental concentration in soil
PEC_{SW}	predicted environmental concentration in surface water
PEC_{GW}	predicted environmental concentration in ground water
PED	plasma-emissions-detector
pH	pH-value
PHED	pesticide handler's exposure data
PHI	pre-harvest interval
PIC	prior informed consent
pic	phage inhibition capacity
PIXE	proton induced X-ray emission
pK_a	negative logarithm (to the base 10) of the dissociation constant
PNEC	predicted no effect concentration
po	by mouth (per os)
P_{ow}	partition coefficient between n-octanol and water
POP	persistent organic pollutants
ppb	parts per billion (10^{-9})
PPE	personal protective equipment
ppm	parts per million (10^{-6})
ppp	plant protection product
ppq	parts per quadrillion (10^{-24})
ppt	parts per trillion (10^{-12})
PSP	phenolsulfophthalein
PrT	prothrombin time
PRL	practical residue limit
PT	prothrombin time
PTDI	provisional tolerable daily intake
PTT	partial thromboplastin time
QSAR	quantitative structure-activity relationship
r	correlation coefficient
r^2	coefficient of determination
RBC	red blood cell
REI	restricted entry interval
R_f	ratio of fronts
RfD	reference dose
RH	relative humidity
RL_{50}	residual lifetime

RNA	ribonucleic acid
RP	reversed phase
rpm	reversed phase material
rRNA	ribosomal ribonucleic acid
RRT	relative retention time
RSD	relative standard deviation
s	second
SAC	strong adsorption capacity
SAP	serum alkaline phosphatase
SAR	structure/activity relationship
SBLC	shallow bed liquid chromatography
sc	subcutaneous
sce	sister chromatid exchange
SD	standard deviation
SE	standard error
SEM	standard error of the mean
SEP	standard evaluation procedure
SF	safety factor
SFC	supercritical fluid chromatography
SFE	supercritical fluid extraction
SIMS	secondary ion mass spectroscopy
SOP	standard operating procedure
sp	species (only after a generic name)
SPE	solid phase extraction
SPF	specific pathogen free
spp	subspecies
sq	square
SSD	sulphur specific detector
SSMS	spark source mass spectrometry
STEL	short term exposure limit
STMR	supervised trials median residue
t	tonne (metric ton)
$t_{1/2}$	half-life (define method of estimation)
T_3	tri-iodothyroxine
T_4	thyroxine
TADI	temporary acceptable daily intake
TAR	total applied radioactivity
TBC	tightly bound capacity
TCD	thermal conductivity detector
TCLo	toxic concentration low
TID	thermionic detector, alkali flame detector
TDLo	toxic dose low
TDR	time domain reflectrometry
TER	toxicity exposure ratio
TER_I	toxicity exposure ratio for initial exposure
TER_{ST}	toxicity exposure ratio following repeated exposure
TER_{LT}	toxicity exposure ratio following chronic exposure
tert	tertiary (in a chemical name)
TEP	typical end-use product

TGGE	temperature gradient gel electrophoresis
TIFF	tag image file format
TLC	thin layer chromatography
Tlm	median tolerance limit
TLV	threshold limit value
TMDI	theoretical maximum daily intake
TMRC	theoretical maximum residue contribution
TMRL	temporary maximum residue limit
TOC	total organic chlorine
Tremcard	Transport emergency card
tRNA	transfer ribonucleic acid
TSH	thyroid stimulating hormone (thyrotropin)
TWA	time weighted average
UDS	unscheduled DNA synthesis
UF	uncertainty factor (safety factor)
ULV	ultra low volume
UV	ultraviolet
v/v	volume ratio (volume per volume)
WBC	white blood cell
wk	week
wt	weight
w/v	weight per volume
w/w	weight per weight
XRFA	X-ray fluorescence analysis
yr	year
<	less than
≤	less than or equal to
>	greater than
≥	greater than or equal to

Part 2 Organisations and Publications

ACPA	American Crop Protection Association
ASTM	American Society for Testing and Materials
BA	Biological Abstracts (Philadelphia)
BART	Beneficial Arthropod Registration Testing Group
CA	Chemical Abstracts
CAB	Centre for Agriculture and Biosciences International
CAC	Codex Alimentarius Commission
CAS	Chemical Abstracts Service
CCFAC	Codex Committee on Food Additives and Contaminants
CCGP	Codex Committee on General Principles
CCPR	Codex Committee on Pesticide Residues
CCRVDF	Codex Committee on Residues of Veterinary Drugs in Food
CE	Council of Europe
CIPAC	Collaborative International Pesticides Analytical Council Ltd

COREPER	Comité des Representants Permanents
EC	European Commission
ECB	European Chemical Bureau
ECCA	European Crop Care Association
ECDIN	Environmental Chemicals Data and Information of the European Communities
ECDIS	European Environmental Chemicals Data and Information System
ECE	Economic Commission for Europe
ECETOC	European Chemical Industry Ecology and Toxicology Centre
ECLO	Emergency Centre for Locust Operations
ECMWF	European Centre for Medium Range Weather Forecasting
ECPA	European Crop Protection Association
EDEXIM	European Database on Export an Import of Dangerous Chemicals
EHC (number)	Environment Health Criteria (number)
EHCD	Environmental Health Criteria Document
EINECS	European Inventory of Existing Commercial Chemical Substances
ELINCS	European List of New Chemical Substances
EMIC	Environmental Mutagens Information Centre
EPA	Environmental Protection Agency
EPO	European Patent Office
EPPO	European and Mediterranean Plant Protection Organisation
ESCORT	European Standard Characteristics of Beneficials Regulatory Testing
EU	European Union
EUPHIDS	European Pesticide Hazard Information and Decision Support System
EUROPOEM	European Predictive Operator Exposure Model
FAO	Food and Agriculture Organisation of the UN
FOCUS	Forum for the Co-ordination of Pesticide Fate Models and their Use
FRAC	Fungicide Resistance Action Committee
GATT	General Agreement on Tariffs and Trade
GAW	Global Atmosphere Watch
GCOS	Global Climate Observing System
GCPF	Global Crop Protection Federation (formerly known as GIFAP)
GEDD	Global Environmental Data Directory
GEMS	Global Environmental Monitoring System
GIEWS	Global Information and Early Warning System for Food and Agriculture
GIFAP	Groupement International des Association Nationales de Fabricants de Produits Agrochimiques (now known as GCPF)
GRIN	Germplasm Resources Information Network
HRAC	Herbicide Resistance Action Committee
IARC	International Agency for Research on Cancer
IATS	International Academy of Toxicological Science
IBT	Industrial Bio-Test Laboratories
ICBB	International Commission of Bee Botany
ICBP	International Council for Bird Preservation
ICES	International Council for the Exploration of the Seas
ICPBR	International Commission for Plant-Bee Relationships
ILO	International Labour Organisation
IMO	International Maritime Organisation

IOBC	International Organisation for Biological Control of noxious Animals and Plants
IPCS	International Programme on Chemical Safety
IRAC	Insecticide Resistance Action Committee
IRC	International Rice Commission
ISCO	International Soil Conservation Organisation
ISO	International Organisation for Standardisation
IUPAC	International Union of Pure and Applied Chemistry
JECFA	FAO/WHO Joint Expert Committee on Food Additives
JFCMP	Joint FAO/WHO Food and Animal Feed Contamination Monitoring Programme
JMP	Joint Meeting on Pesticides (WHO/FAO)
JMPR	Joint Meeting of the FAO Panel of Experts on Pesticide Residues in Food and the Environment and the WHO Expert Group on Pesticide Residues (Joint Meeting on Pesticide Residues)
NATO	North Atlantic Treaty Organisation
NAFTA	North American Free Trade Agreement
NCI	National Cancer Institute (USA)
NCTR	National Centre for Toxicological Research (USA)
NGO	non-governmental organisation
NTP	National Toxicology Programme (USA)
OECD	Organisation for Economic Co-operation and Development
OLIS	On-line Information Service of OECD
PAN	Pesticides Action Network
RNN	Re-registration Notification Network
RTECS	Registry of Toxic Effects of Chemical Substances (USA)
SCPH	Standing Committee on Plant Health
SETAC	Society of Environmental Toxicology and Chemistry
SI	Systeme International d'Unites
SITC	Standard International Trade Classification
TOXLINE	Toxicology Information On-line
UN	United Nations
UNEP	United Nations Environment Programme
WCDP	World Climate Data Programme
WCP	World Climate Programme
WCRP	World Climate Research Programme
WFP	World Food Programme
WHO	World Health Organisation
WTO	World Trade Organisation
WWF	World Wide Fund for Nature

Appendix 2

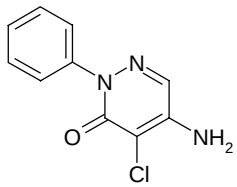
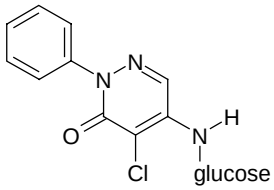
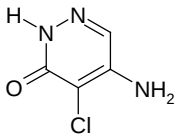
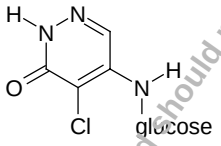
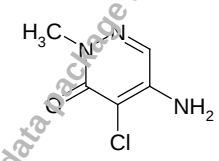
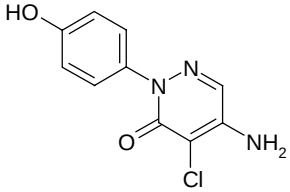
Chloridazon

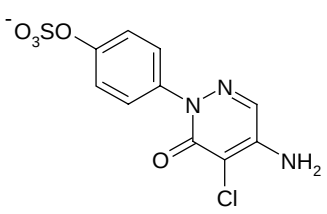
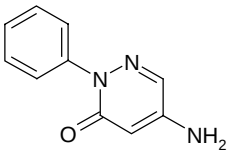
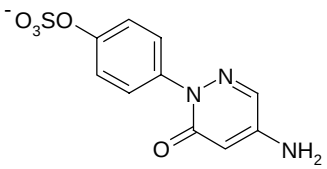
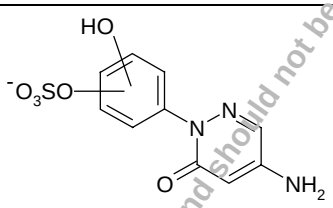
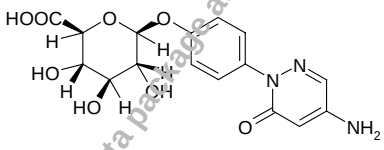
Specific Terms and Abbreviations

2.8.2 Appendix II: Specific terms and abbreviations

PAS	pure active substance
TAS	technical active substance

Metabolites of chloridazon found in different matrices

Code / Trivial Name	Chemical Structure	Chemical Name [CAS] or IUPAC	Matrix
Chloridazon		5-amino-4-chloro-2-phenyl-3(2H)-pyridazinone (CAS) 5-amino-4-chloro-2-phenylpyridazine-3-one (IUPAC)	rat, goat, hen, sugar beet, soil, surface water
Metabolite A			sugar beet
Metabolite B		5-amino-4-chloro-3(2H)-pyridazinone (CAS) 5-amino-4-chloro-pyridazine-3-one (IUPAC)	sugar beet, soil, surface water, ground water
Metabolite B - glucoside			sugar beet
Metabolite B-1		5-amino-4-chloro-2-methyl-3(2H)-pyridazinone (CAS) 5-amino-4-chloro-2-methylpyridazine-3-one (IUPAC)	soil, ground water
4-OH-chloridazon (BH 119-4-OH)		5-amino-4-chloro-2-(4-hydroxyphenyl)-3(2H)-pyridazinone (CAS) 5-amino-4-chloro-2-(4-hydroxyphenyl)-pyridazine-3-one (IUPAC)	rat, goat, hen

Sulfate conjugate of BH 119-4-OH		5-amino-4-chloro-2-(4-sulfatophenyl)-3(2H)-pyridazinone (CAS) 5-amino-4-chloro-2-(4-sulfatophenyl)-pyridazine-3-one (IUPAC)	rat, goat, hen
Deschloro-chloridazon		5-amino-2-phenyl-3(2H)-pyridazinone (CAS) 5-amino-2-phenyl)-pyridazine-3-one (IUPAC)	goat, hen
Sulfate conjugate of deschloro-chloridazon		5-amino-2-(4-sulfato-phenyl)-3(2H)-pyridazinone (CAS) 5-amino-2-(4-sulfato-phenyl)-pyridazine-3-one (IUPAC)	rat
Sulfate conjugate of phenyl ring dihydroxylated chloridazon			rat
Glucuronide of BH 119-4-OH			rat

Appendix 3

Chloridazon

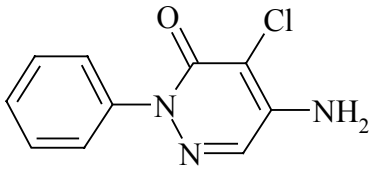
List of End Points

2.8.3 Appendix III: Listing of end points

2.8.3.1 Appendix III.1: Chapter 1 (identity, physical and chemical properties, details of uses, further information, classification and labelling)

Active substance (ISO Common Name)	Chloridazon
Function (*e.g.* fungicide)	Herbicide
Rapporteur Member State	Federal Republic of Germany

Identity (Annex IIA, point 1)

Chemical name (IUPAC)	5-amino-4-chloro-2-phenylpyridazin-3(2H)-one
Chemical name (CA)	5-amino-4-chloro-2-phenyl-3(2H)-pyridazinone
CIPAC No	111
CAS No	1698-60-8
EEC No (EINECS or ELINCS)	216-920-2
FAO Specification (including year of publication)	910 g/kg (minimum purity) (AGP:CP/346, 1997)
Minimum purity of the active substance as manufactured	920 g/kg
Identity of relevant impurities (of toxicological, environmental and/or other significance) in the active substance as manufactured	max 60 g/kg 5-amino-5-chloro-isomer (AGP:CP/346, 1997)
Molecular formula	$C_{10}H_8ClN_3O$
Molecular mass	221.6 g/mol
Structural formula	

Physical-chemical properties (Annex IIA, point 2)

Melting point (state purity)	205.9 – 206.8 °C (99.9 %)		
Boiling point (state purity)	–		
Temperature of decomposition	> 360 °C		
Appearance (state purity)	crystalline, colourless solid (99.9 %)		
Relative density (state purity)	1.513 (99.9 %)		
Surface tension	72 mN/m		
Vapour pressure (state temperature)	$1 \cdot 10^{-9}$ Pa (20 °C)		
Henry's law constant	$5.3 \cdot 10^{-10}$ Pa m^3 mol^{-1} (20 °C)		
Solubility in water state temperature)	pH 4: 0.410 g/L pH 7: 0.422 g/L deionised water: 0.422 g/L		all at 20 °C
Solubility in organic solvents (state temperature)	Methanol Acetone Acetonitrile Isopropanol Ethylacetate Octanol Olivenöl Dichlormethane Toluene Lutrol®	15.1 g/L 12.4 g/L 8.4 g/L 5.4 g/L 3.7 g/L 3.1 g/L 0.2 g/L 0.19 g/L 0.1 g/L 26.7 g/L	all at 20 °C
Partition co-efficient (log P_{OW}) (state pH and temperature)	1.2 (25 °C)		
Hydrolytic stability (DT_{50}) (state pH and temperature)	pH 5, 7 and 9: stable for 30 d (25 °C)		
Dissociation constant	–		
UV/VIS absorption (max.) (if absorption > 290 nm state ε at wavelength)	λ_{max} [nm] 210 229 286	ε 18577 25043 10088	
Photostability (DT_{50}) (aqueous, sunlight, state pH)	150 h (artificial sunlight, pH 7)		
Quantum yield of direct phototransformation in water at λ > 290 nm	$2 \cdot 10^{-4}$ mol/Einstein		
Flammability	none		
Explosive properties	none		

Summary of representative uses evaluated (chloridazon, 12.12.2004)

Crop and/ or situation (a)	Member State or Country	Pro-duct name	F G or I (b)	Pests or Group of pests Controlled (c)	Formulation		Application				Application rate per treatment			PHI (days) (l)	Remarks: (m)
					Type (d-f)	Conc. of g as/kg (i)	Method, Kind (f-h)	Growth stage & Season (j)	Num-ber min max (k)	Interval between applica-tions (min)	kg as/hL min max	Water L/ha min max	kg as/ha min max		
Northern Europe															
Beta beet, onion, shallot, garlic, flowers and nursery			F	Weeds (general) up to BBCH 14-16	WG	650	Hydraulic sprayer overall	Pre-seeding Pre-emergence up to BBCH 19	1 3	-	0.65 - 1.3	200 - 400	max. 2.6	[1)]	supported under the provision: max. of 2.6 kg/ha only every third year on the same field
Southern Europe															
Beta beet			F	Weeds (general) up to BBCH 14-16	WG	650	Hydraulic sprayer overall	Pre-seeding Pre-emergence up to BBCH 19	1	-	0.43 - 1.3	200 - 600	max. 2.6	[1)]	supported under the provision: max. of 2.6 kg/ha only every third year on the same field

(a) For crops, the EU and Codex classifications (both) should be used; where relevant, the use situation should be described (*e.g.* fumigation of a structure)
(b) Outdoor or field use (F), glasshouse application (G) or indoor application (I)
(c) *e.g.* biting and suckling insects, soil born insects, foliar fungi, weeds
(d) *e.g.* wettable powder (WP), emulsifiable concentrate (EC), granule (GR)
(e) GCPF Codes - GIFAP Technical Monograph No 2, 1989
(f) All abbreviations used must be explained
(g) Method, *e.g.* high volume spraying, low volume spraying, spreading, dusting, drench
(h) Kind, *e.g.* overall, broadcast, aerial spraying, row, individual plant, between the plant - type of equipment used must be indicated
(i) g/kg or g/L
(j) Growth stage at last treatment (BBCH Monograph, Growth Stages of Plants, 1997, Blackwell, ISBN 3-8263-3152-4), including where relevant, information on season at time of application
(k) Indicate the minimum and maximum number of application possible under practical conditions of use
(l) PHI - minimum pre-harvest interval/[1)] PHI covered by conditions of use
(m) Remarks may include: Extent of use/economic importance/restrictions/RMS: not/supported by available data

Classification and proposed labelling (Annex IIA, point 10)

with regard to physical/chemical data	none
with regard to toxicological data	none
with regard to fate and behaviour data	possibly a candidate for R53
with regard to ecotoxicological data	N, R51/R53, dangerous for the environment

2.8.3.2 Appendix III.2: Chapter 2 (methods of analysis)

Analytical methods for the active substance (Annex IIA, point 4.1)

Technical as (principle of method)	HPLC-UV
Impurities in technical as (principle of method)	HPLC-UV
Plant protection product (principle of method)	HPLC-UV

Analytical methods for residues (Annex IIA, point 4.2)

Food/feed of plant origin (principle of method and LOQ for methods for monitoring purposes)	HPLC-MS/MS	0.05 mg/kg (chloridazon, all kinds of crops); 0.05 mg/kg (metabolite B, all kinds of crops)
Food/feed of animal origin (principle of method and LOQ for methods for monitoring purposes)	HPLC-MS/MS	0.01 mg/kg (bovine milk; metabolite B) 0.05 mg/kg (bovine muscle, liver, kidney, fat; hen egg; metabolite B)
Soil (principle of method and LOQ)	HPLC-DAD	0.01 mg/kg (chloridazon)
Water (principle of method and LOQ)	<u>Drinking water</u>: HPLC-DAD	0.05 µg/L (chloridazon) 0.05 µg/L (metabolite B) 0.05 µg/L (metabolite B-1)
	<u>Surface water:</u> HPLC-DAD	0.05 µg/L (chloridazon)
Air (principle of method and LOQ)	HPLC-UV	3 µg/m³
Body fluids and tissues (principle of method and LOQ)	not relevant	

2.8.3.3 Appendix III.3: Chapter 3 (impact on human and animal health)

Absorption, distribution, excretion and metabolism in mammals (Annex IIA, point 5.1)

Rate and extent of absorption	Rapid and nearly complete (>90 %) oral absorption in rats
Distribution	Widely, with highest concentrations in heart, kidneys and adrenals
Potential for accumulation	Low
Rate and extent of excretion	85-90 % via urine, 7-26 % via faeces within 72 h (biliary excretion 37 % in males, 12 % in females)
Metabolism in animals	Rapid, extensive, primarily by oxidation, hydroxylation and conjugation to glucuronide and sulfate, 3 major metabolites in urine (of at least 9 metabolites)
Toxicologically significant compounds (animals, plants and environment)	Parent compound, soil and plant metabolites B and B-1

Acute toxicity (Annex IIA, point 5.2)

Rat LD_{50} oral	2200 mg/kg bw (isomer reduced substance production since about 1985)
Rat LD_{50} dermal	> 2000 mg/kg bw
Rat LC_{50} inhalation	> 5.4 mg/L air (4 h, nose only)
Skin irritation	Not irritant
Eye irritation	Not irritant
Skin sensitisation (test method used and result)	Not sensitising

Short term toxicity (Annex IIA, point 5.3)

Target / critical effect	Liver (increased organ weight, clinical chemical changes), stomach (histological changes in stomach mucosa) , kidney in dogs at high doses only; reduced food consumption and body weight (5000 ppm), mortality only (10000 ppm)
Lowest relevant oral NOAEL / NOEL	Rat, 90 days: 21 mg/kg bw/day (300 ppm) Dog, 90 days: 97 mg/kg bw/day (3000 ppm), Dog, 12 months: 11 mg/kg bw/day (400 ppm)
Lowest relevant dermal NOAEL / NOEL	Rabbit, 21 days: 1000 mg/kg bw/day
Lowest relevant inhalation NOAEL / NOEL	Not submitted, not necessary

Genotoxicity (Annex IIA, point 5.4)

No genotoxic potential

Long term toxicity and carcinogenicity (Annex IIA, point 5.5)

Target / critical effect	Liver (increased organ weight, histological changes), changes in hematological and clinical chemical parameters; muscle atrophy at high doses, reduced body weight
Lowest relevant NOAEL / NOEL	Rat, 30 months: 13 mg/kg bw/day (300 ppm)
Carcinogenicity	No carcinogenic potential

Reproductive toxicity (Annex IIA, point 5.6)

Reproduction target / critical effect	Impaired bw gain in pups at parentally toxic doses
Lowest relevant reproductive NOAEL / NOEL	37 mg/kg bw/day (400 ppm)
Developmental target / critical effect	No teratogenic potential
Lowest relevant developmental NOAEL / NOEL	Rat: 250 mg/kg bw/day

Neurotoxicity / Delayed neurotoxicity (Annex IIA, point 5.7)

No studies provided as other toxicological studies demonstrated no evidence of neurotoxic potential.

Other toxicological studies (Annex IIA, point 5.8)

Metabolite B:
Acute tox., rat: LD50 >5000 mg/kg bw
90 days, rat: NOAEL 15 mg/kg bw/d (200 ppm)
No evidence of mutagenicity *in vitro* (Ames test, V79/HPRT test, cytogenetics)
No developmental tox. in rats (NOAEL 120 mg/kg bw/d)
Metabolite B-1:
Acute tox., rat: LD50 1200 mg/kg bw
90 days, rat: NOAEL > 50 mg/kg bw/d
No evidence of mutagenicity *in vitro* (Ames test, CHO/HPRT, cytogenetics) and *in vivo* (bone marrow cytogenetics)
Developmental tox., rat: NOAEL 10 mg/kg bw
Metabolite A: no toxicological studies available

Medical data (Annex IIA, point 5.9)

Skin/eye irritation (few cases) and sensitisation (1 case) in workers reported

Summary (Annex IIA, point 5.10)

	Value	Study	Safety factor
ADI	0.1 mg/kg bw day	Rat, 30 months supported by Dog, 12 months	100
AOEL systemic	0.2 mg/kg bw day	Rat, 90 days	100
ARfD (acute reference dose)	Not allocated, not necessary		

Dermal absorption (Annex IIIA, point 7.3)

4 % (rat *in vivo*, 10 h exposure; including skin residues)

Acceptable exposure scenarios (including method of calculation)

Operator	Acceptable for proposed use (German model; without PPE)
Workers	Acceptable for proposed use
Bystanders	Acceptable for proposed use

2.8.3.4 Appendix III.4: Chapter 4 (residues)

Metabolism in plants (Annex IIA, point 6.1 and 6.7, Annex IIIA, point 8.1 and 8.6)

Plant groups covered	Sugar beets
Rotational crops	Chard, sugar beet, oat, wheat, radish, sorghum
Plant residue definition for monitoring	Chloridazon and metabolite B, expressed as chloridazon equivalents
Plant residue definition for risk assessment	Chloridazon and its metabolites A and B, expressed as chloridazon equivalents
Conversion factor (monitoring to risk assessment)	none

Metabolism in livestock (Annex IIA, point 6.2 and 6.7, Annex IIIA, point 8.1 and 8.6)

Animals covered	Lactating goat, laying hen
Animal residue definition for monitoring	Metabolite B, expressed as chloridazon
Animal residue definition for risk assessment	Sum of chloridazon and metabolite B, expressed as chloridazon equivalents
Conversion factor (monitoring to risk assessment)	none
Metabolism in rat and ruminant similar (yes/no)	yes
Fat soluble residue: (yes/no)	no

Residues in succeeding crops (Annex IIA, point 6.6, Annex IIIA, point 8.5)

Residues in succeding crops may exceed 0.01 mg/kg

Stability of residues (Annex IIA, point 6 introduction, Annex IIIA, point 8 introduction)

Sugar beet root, sugar beet top, refined sugar, molasses, dried pulp < 24 months

Summary of critical residues data (Annex IIA, point 6.3, Annex IIIA, point 8.2)

Crop	Northern or Mediterranean Region	Trials results relevant to the critical GAP	Recommendation/ comments	MRL [mg/kg]	STMR [mg/kg]
sugar beet, fodder beet	both	< 0.13(13), 0.13(7), 0.14, 0.16, 0.18, 0.20 mg/kg chloridazon + metabolite A + metabolite B, expressed as chloridazon		0.3	0.13
red beet, beta beet, chard	both	< 0.13, 0.14, 0.16(3), 0.19 mg/kg chloridazon + metabolite A + metabolite B, expressed as chloridazon		0.5	0.16
onion, shallot, garlic	both	< 0.13(3), 0.14 mg/kg chloridazon + metabolite A + metabolite B, expressed as chloridazon < 0.13 mg/kg chloridazon + metabolite B, expressed as chloridazon		0.2	0.13
chard	Northern	0.62, 0.76, 0.86, 1.2, 1.4, 1.5 mg/kg chloridazon/metabolite A + metabolite B, calculated as chloridazon		3	1.03
flowers and nursery	both	not necessary			

Consumer risk assessment (Annex IIA, point 6.9, Annex IIIA, point 8.8)

ADI	0,1
ITMDI (European Diet) (% ADI)	4,.3 %
NTMDI (German Diet) (% ADI)	5.3 %
ARfD	not necessary
Acute exposure (Dutch large portions) (% ARfD)	not necessary

Processing factors (Annex IIA, point 6.5, Annex IIIA, point 8.4)

Crop/processed crop	Number of studies	Transfer factor	% Transference
not applicable			

Proposed MRLs (Annex IIA, point 6.7, Annex IIIA, point 8.6)

Proposed MRLs	Plant matrices: Sugar beet : 0.3 mg/kg Red beet: 0.5 mg/kg Chard: 3 mg/kg Onion: 0.2 mg/kg Animal matrices: All animal products: 0.1 mg/kg

2.8.3.5 Appendix III.5: Chapter 5 (fate and behaviour in the environment)

Fate and Behaviour in the Environment

Route of degradation (aerobic) in soil (Annex IIA, point 7.1.1.1.1)	
Mineralisation after 100 days ‡	Sandy loam: 5.6 % after 120 days (^{14}C-chloridazon) 18.6 % after 373 d (study end) Sandy clay loam: 2.2 % after 124 days (^{14}C-chloridazon) 3.9 % after 367 days (study end)
Non-extractable residues after 100 days ‡	Sandy loam: 9.3 % after 120 days (^{14}C-chloridaz.) 12.7 % after 373 days (study end) Sandy clay loam: 13.3 % after 124 days (^{14}C-chloridaz.) 19.0 % after 367 days (study end)
Relevant metabolites - name and/or code, % of applied (range and maximum) ‡	Metabolite B: increasing during the study 13.8 - 16.9 % after 120 days max. 55.9 % after 373 days (study end) (^{14}C-chloridazon, 25 °C, 75 % field capacity, soil: % sand/silt/clay 54/32/14 and 67/9/24): Metabolite B-1 was not analysed in metabolism studies, but detected in rate study with metabolite B and in lysimeter leachate.

Route of degradation in soil - Supplemental studies (Annex IIA, point 7.1.1.1.2)			
Anaerobic degradation ‡	Chloridazon (tested: ^{14}C-chloridazon):		
		Sandy clay loam	Sandy loam
	Unchanged as:	81.5 % after 91 d	89.6 % after 90 d
	Bound residues:	9.7 % after 91 d	6.2 % after 90 d
	Mineralisation:	1.2 % after 91 d	3.5 % after 90 d
	Metabolite B:	8.8 % after 91 d	4.8 % after 90 d
Soil photolysis ‡	Soil: loamy sand, Corg 1.9 %, 80 % sand; 13 % silt; 6.7 % clay. After 15 d (% TAR ^{14}C-chloridazon): 57 %- 61 % chloridazon remained; Mineralisation 13 % - 14 %, bound residues 6 %; no metabolites > 5 % TAR		

Rate of degradation in soil (Annex IIA, point 7.1.1.2, Annex IIIA, point 9.1.1)			
Method of calculation	Lab. DT_{50} aerob: ModelMaker Version 4.0 Lab DT_{90} aerob: Timme and Frehse best fit Lab DT_{50} anaerob: Regression analysis Lab DT_{50} aerob metabolites: ModelMaker 3.0.4, best fit		
Laboratory studies (range or median, with n value, with r^2 value) ‡	DT_{50lab} (20°C, aerobic): pF2 normalised Chloridazon 20 °C,		
	Sandy clay loam:	173.9 d (r^2 0.98)	
	Sandy loam:	157.1 d (r^2 0.96)	
	Loam	9.0 d	
	Loamy sand:	8.6 d	
	Clay:	40.6 d	
	Loamy sand:	75.1 d	
	geometric mean	43.1 d	
	Metabolites:	Metab. B	Metab. B-1

	(20 °C, 40 % MWHC) days (r^2) days (r^2) Sandy loam Limburgerhof 80 (0.97) 135 (0.97) Loamy sand Limburgerhof 93 (0.94) 118 (0.95) Sandy loam LUFA 2.3 132 (0.79) 152 (0.84) Loamy sand LUFA 2.2 120 (0.95) 170 (0.94
	DT_{90lab} (20°C, aerobic): Chloridazon 20 °C, Loam 50 d Loamy sand: 54 d Clay: > 100 d Loamy sand: 140 d Metabolites B; B-1: > 120 d
	DT_{50lab} (10°C, aerobic): not measured. Calculated by RMS with Q10 (2.2) from above-quoted pF2 normalised 20 °C DT_{50} values: median 89.3 d; range: 18.9 – 382.6 d; n=6
	DT_{50lab} (25°C, anaerobic): Sandy clay: 370 d Sandy loam: 607 d
	Degradation in the saturated zone: ‡ not relevant
Field studies (state location, range or median with n value) ‡	DT_{50f}: chloridazon 3 – 79 d; median 26.0 ; n=10 European trials: bare soils, vegetation free during study; USA trials: pre-emergence, sugar beets [1] regression 1st order kinetic [2] Timme and Frehse, best fit [3] slope of degradation curve [4] ModelMaker 3.0.4, 1sr order kinetic Location soil DT_{50f} (r^2) Sweden silty sand 79 (0.85) [1] Germany sandy loam 5 (0.74) [2] Germany clayey sand 53 (0.91) [2] Germany heavy loam sand 22 (0.66) [2] Germany loam 11 (0.75) [2] Germany loam 3 (0.64) [2] USA varies 68 (0.83) [3] USA sandy loam 59 (0.76) [3] Italy sandy loam 17 (0.89) [4] Spain clay silt loam 30 (0.89) [4] Metabolite B Location soil DT_{50f} (r^2) Sweden silty sand 359.5 (0.85) [1] USA varies 217 (0.661) [3] USA sandy loam 130 (0.394) [3]

	DT_{90f}: chloridazon 35 - 214 d; median 87, n=8 Location / DT_{90f} / (r^2) Sweden, silty sand, 214, (0.85) [1] Germany, sandy loam, 53, (0.74) [2] Germany, clayey sand, 178, (0.91) [2] Germany, heavy loam sand, 74, (0.66) [2] Germany, loam, 118, (0.75) [2] Germany, loam, 35, (0.64) [2] Italy, sandy loam, 55.7, (0.89) [4] Spain, clay silt loam, 99.6, (0.89) [4]
Soil accumulation and plateau concentration ‡	Based on degradation studies, no accumulation expected

Soil adsorption/desorption (Annex IIA, point 7.1.2)	
K_f /K_{oc} ‡ K_d ‡	Chloridazon soil / Kf / Koc / 1/n sandy loam / 0.2 / 89 / 0.568 sandy loam / 0.69 / 128 / 0.914 sand / 0.25 / 220 / 1.030 silty loam / 1.0 / 220 / 0.836 clay / 3.6 / 340 / 0.877 arithm. mean / 199 / 0.845 Metabolite B particles < 0.02 mm / Corg / pH / CEC mval /100g / Kf / Koc / 1/n 10.7 / 0.7 / 7.0 / 5.0 / 0.34 / 49 / 0.804 23.2 / 0.9 / 7.3 / 9.0 / 0.42 / 46 / 0.819 40.0 / 0.6 / 7.3 / 13.0 / 0.43 / 74 / 0.844 14.9 / 2.4 / 6.0 / 10.0 / 0.71 / 29 / 0.868 arithm. mean / 50 / 0.834 Metabolite B-1 soil / Kf / Koc / 1/n loamy sand / 0.40 / 100 / 0.794 loamy sand / 0.43 / 39 / 0.861 sandy loam / 0.50 / 33 / 0.851 loam / 0.68 / 136 / 0.915 sand/loamy sand / 0.68 / 27 / 0.907 sandy clay loam / 7.34 / 216 / 0.871 arithm. mean / 92 / 0.867
pH dependence (yes / no) (if yes type of dependence)	no pH dependency

Mobility in soil (Annex IIA, point 7.1.3, Annex IIIA, point 9.1.2)	
Column leaching ‡	Guideline: BBA Merkblatt No 37 German standard soils LUFA 2.1, 2.2, 2.3 Applied amount 2.6 kg as/ha, 200 mm irrigation Conc. in leachate: LUFA soil 2.1 / 2.2 / 2.3 Chloridazon: 25.2 % / < 0.8 % / 16.2 % Metabolites: no detected

Aged residues leaching ‡	Guideline: BBA IV 4-2 German standard soil LUFA 2.1 (sandy soil); soil conc. 3 mg as/ha, 200 mm irrigation, 30 d aerobic preincubation (22 °C, 40 % WHC) Conc. in leachate: 0.3 % of total residue radioactivity as chloridazon and metabolite B. 14.7 % TRR (total) retained in top soil segment 1

Lysimeter/ field leaching studies ‡	**1)** Location: Germany, Northrhine-Westfalia - Study type: lysimeters, 1x silty loam (LY-TP, 0.1-6.4 % sand, 73-78 % silt, 15-27 % clay); 2 x loamy sand (LY -SPB, 50-94 % sand, 4.6-37 % silt, 1.7-13.8 % clay) - Test substance: (4,5-^{14}C)chloridazon - Number of applications: 1 application equiv. to 2.6/2.0 kg as/ha on sugar beet, pre-emergence LY-TP LY-SPB - Average annual rainfall 1. year 773 mm 785 mm 2. year 820 mm 808 mm - Average annual leachate volume (1989-1991): 1. year 113 L/m² 130 L/m² 2. year 127 L/m² 200 L/m² - % radioactivity in leachate (overall balance): % TAR 0.32 7.05 - Maximum annual average concentrations (µg/L): Chloridazon as: 0.009 µg/L <0.05 µg/L Metabolite B: 2.13 µg/L 40.6 µg/L Metabolite B-1: 0.1 µg/L 2.1 µg/L **2)** Location: Germany, Northrhine-Westfalia - Study type: lysimeters, loamy sand (LY-SPB, 71-91 % sand, 5.9-25 % silt, 2.9-5.2 % clay - Test substance: non-radiolabelled chloridazon - Number of applications: 1 application correspond. to 1.82 kg as/ha on sugar beet, pre-emergence - Average annual rainfall: 1st year 839.8 mm/year; 2nd year 780.3 mm/year - Average annual leachate volume (1993-1992): 29.75 L 1st year, 130.6 L 2nd year - Maximum annual average concentrations: Chloridazon as: <0.05 µg/L Metabolite B: 4.1 / 12.2 µg/L

PEC (soil) (Annex IIIA, point 9.1.3)

Parent

Method of calculation	Compartment model, ModelMaker 4.0, all fluxes were parameterised with first order rate constants. 0 % crop interception, soil bulk density 1.5 kg/L, 5 cm soil layer. Chloridazon $DT_{50\ field}$ worst case: 78.5 d
Application rate	2.6 kg as/ha

PEC$_{(s)}$ (mg/kg)	Single application Actual	Single application Time weighted average	Multiple application Actual	Multiple application Time weighted average
Initial	3.467			
Short term 24h	3.436	3.451	--	--
2d	3.406	3.435		
4d	3.346	3.406		
Long term 7d	3.259	3.362	--	--
28d	2.707	3.071		
42d	2.392	2.897		
100d	1.434	2.303		

Metabolite

Method of calculation	Compartment model, ModelMaker 4.0, covering the as and its metabolites B and B-1. Worst case first order transformation rate constants based on worst case field half-life of metabolite B (132 d) and worst case rate constants describing the kinetic equilibrium between the metabolite B and B-1. All fluxes were parameterised with first order rate. The molar formation fraction of metabolite B from as was 64.8 % obtained in a laboratory metabolism study. No corrections of transformation rates for temperature or soil moisture. Results include corrections for molar weight differences of the compounds. Worst case kinetic equilibrium between Metab. B and Metabolite B-1: k_{12}=0.00329 Metabolite B-1: k_{21}=0.0105
Application rate	2.6 kg as/ha, one annual application per-emergence, 0 % crop interception, soil bulk density 1.5 kg/L, 5 cm soil layer

PEC$_{(s)}$ (mg/kg)	Metabolite B Single application Actual	Metabolite B Single application Time weighted average	Metabolite B-1 Multiple application Actual	Metabolite B-1 Multiple application Time weighted average
Initial	0.600		0.172	
Short term 24 h	0.600	0.600	0.172	0.172
2 d	0.600	0.600	0.172	0.172
4 d	0.600	0.600	0.172	0.172
Long term 7 d	0.600	0.600	0.172	0.172
28 d	0.591	0.599	0.171	0.172
42 d	0.582	0.598	0.169	0.172
100 d	0.521	0.589	0.156	0.170

Route and rate of degradation in water (Annex IIA, point 7.2.1)

Hydrolysis of active substance and relevant metabolites (DT_{50}) (state pH and temperature) ‡	pH 5 25 °C: no hydrolysis occurred, chloridazon is stable over 30 days
	pH 7 25 °C: no hydrolysis occurred, chloridazon is stable over 30 days:
	pH 9 25 °C: no hydrolysis occurred, chloridazon is stable over 30 days:
Photolytic degradation of active substance and relevant metabolites ‡	Direct photolysis Chloridazon: Theoretical DT_{50} March, April, May, June: 75.6, 36.8, 25.9, 21.6 days Metabolite B: Theoretical DT_{50} April, May, June, July, August: 8.72, 6.96, 6.25, 6.95, 7.0 days Photolysis in natural water pH 8, TOC 12-13 mg/L, nitrate < 0.5-2 mg/L, Suntest, 15 days continuous irradiation, 22 °C: DT_{50} continuous irradiation 12/12 h day/night Chloridazon: 23.3 d 46.6 Metabolite B: 5.9 d 11.8 Metabolite B-1: 1.2 d 2.4
Readily biodegradable (yes/no) ‡	No data submitted, none required
Dissipation in water/sediment - DT_{50} water ‡ - DT_{90} water ‡ - DT_{50} whole system ‡ - DT_{90} whole system ‡ - DT_{50} water (only degradation) ‡	Chloridazon: system A system B $DT_{50,water}$ 57.6* / 76**/35*** 104.5* / 66*** $DT_{90,water}$ >200** -** / 93*** system A system B $DT_{50,system}$ 182**/200*** 74*** $DT_{90,system}$ >200 - **/ 96*** * ModelMaker 3.0.4 1st order ** Timme and Frehse, 1st order *** best fit from interpolated experimental data system A system B $DT_{50,water\ degradation}$ 108.2 145.6 ModelMaker 4.0
Mineralisation	3.4 % (system A); 8.1 % (system B) after 100 d at study end
Non-extractable residues	21.4 % (system A); 20.7 % (system B) after 100 d at study end

Distribution in water / sediment systems (active substance) ‡	Maximum values: system A: 34.0 % applied radioactivity (AR) in sediment after 60 days. system B: 16.5/15.8 %AR in sediment after 30/60 days.

% total applied radioactivity (^{14}C chloridazon)

DAT	(A) **water**	(B)	(A) **sediment**	(B)
0	93.6	89.3	0.6	2.8
0.25	89.6	87.0	5.5	5.5
1	80.6	80.0	10.8	10.0
2	77.2	78.5	13.2	8.9
7	66.8	74.2	22.3	13.3
14	59.9	72.0	25.9	12.6
30	47.9	64.6	29.7	16.5
60	38.5	59.1	34.0	15.8
100	37.1	6.3	27.1	2.2

Distribution in water / sediment systems (metabolites) ‡	Metabolite B: maximum values system A: 0.6 % AR in sediment after 30 days. system B: 7.3 %AR in sediment after 100 days.

% total applied radioactivity (^{14}C chloridazon)

DAT	(A) **water**	(B)	(A) **sediment**	(B)
0	<0.1	<0.1	<0.1	<0.1
0.25	<0.1	<0.1	<0.1	<0.1
1	<0.1	<0.1	<0.1	<0.1
2	<0.1	<0.1	<0.1	<0.1
7	<0.1	<0.1	<0.1	0.2
14	<0.1	<0.1	<0.1	0.1
30	1.0	0.5	0.6	0.2
60	0.8	2.3	0.3	0.5
100	1.4	42.6	0.3	7.3

Metabolite B-1: maximum values
system A: < 0.1 % AR in sediment after 100 days
system B: < 0.1 % AR in sediment after 100 days

PEC (surface water) (Annex IIIA, point 9.2.3)

Parent

Method of calculation	FOCUS surface water STEP 3. FOCUS SWAH 1.1 tool 4 scenarios: D3, D4, R1, R3; Input parameters: DT_{50} degradation water phase 125.5 d, sediment 182 d; DT_{50} soil geom. mean 43.2 d (standardised), K_{oc} arithm mean 199 L/kg; 1/n 0.845; Molar mass 221.65; vapour pressure 10^{-9} Pa, molar enthalpie vapour. 95000 J/mol; water solub. 422 mg/L(pH 4.4, 20 °C); molar enthalpy. dissol. 2700 J/mol; diffusion coefficient water $4.3x10^{-5}$ m²/d; diffusion coefficient air 0.43 m²/d;
Application rate	One annual application of 2.6 kg as/ha, pre-emergence
Main routes of entry	Spray drift and run-off

PEC$_{(sw)}$ (µg / L) highest concentrations of R- or D-type	R 3 stream Actual	R 3 stream Time weighted average	D 3 ditch Actual	D 3 ditch Time weighted average
Initial (Global max.)	130.9		13.62	
Short term 24h	94.37	51.49	6.132	10.45
2d	0.318	42.71	0.782	6.663
4d	0.055	21.44	0.040	3.438
Long term 7d	43.42	12.80	0.004	1.974
14d	0.013	8.214	0.002	0.990
21d	0.007	5.483	0.001	0.661
28d	0.004	4.114	0.001	0.496
42d	0.004	2.806	0.001	0.331

Metabolite

Method of calculation	FOCUS Surface water STEP 3 FOCUS SWASH 1.1 tool, 4 scenarios: D3, D4, R1, R3; Input parameters metabolite B: no degradation in water and sediment phase (worst case); DT_{50} soil arithm. mean 108 d (standardised), K_{oc} arithm mean 50 L/kg; 1/n 0.834; Molar mass 145.55; vapour pressure 10^{-9} Pa, molar enthalpie vapour. 95000 J/mol; water solub. 422 mg/L (pH 4.4, 20 °C); molar enthalpy. disssol. 2700 J/mol; diffusion coefficient water $4.3x10^{-5}$ m²/d; diffusion coefficient air 0.43 m²/d; PECsw initial calculated based on maximum percentage observed, max. in water 0.426 %, in soil 0.648 %.
Application rate	One annual application of 2.6 kg as/ha, pre-emergence
Main routes of entry	Spray drift and run-off

PEC$_{(sw)}$ (µg / L) highest concentrations of R or D-type	Metabolite B R3 stream Actual	Metabolite B R3 stream Time weighted average	Metabolite B D4 pond Actual	Metabolite B D4 pond Time weighted average
Initial	2.281		28.57	
Short term 24h	1.633	0.899	28.56	28.57
2d	0.004	0.743	28.54	28.57
4d	0.001	0.373	28.46	28.56
Long term 7d	1.280	0.213	28.28	58.53
14d	0	0.159	27.71	28.43
21d	0	0.106	27.08	28.26
28d	0	0.08	26.43	28.06
42d	0	0.059	25.15	27.60

PEC (sediment)

Parent

Method of calculation	see PEC surface water
Application rate	One annual application of 2.6 kg as/ha, pre-emergence

PEC$_{(sed)}$ (µg / kg) highest concentrations of R or D-type	R3 stream Actual	R3 stream Time weighted average	D4 pond Actual	D4 pond Time weighted average
Initial (Global max.)	27.61		10.73	
Short term 24 h	3.339	4.150	10.73	10.73
2 d	2.514	3.756	10.73	10.73
4 d	1.841	3.081	10.73	10.73
Long term 7 d	1.437	2.504	10.72	10.73
14 d	1.061	1.885	*	10.73
21 d	0.891	1.587	*	10.72
28 d	0.785	1.402	*	10.72
42 d	0.654	1.176	*	10.72

* simulated period too short for calculation of PEC_{twa}

Metabolite

Method of calculation			see PEC surface water calculation for metabolite B	
Application rate			One annual application of 2.6 kg as/ha, pre-emergence	
PEC$_{(sed)}$ (µg / kg) highest concentrations of R or D-type	Metabolite B R3 stream Actual	Metabolite B R3 stream Time weighted average	Metabolite B D4 pond Actual	Metabolite B D4 pond Time weighted average
Initial	0.350		81.58	
Short term 24h	0.206	0.298	81.58	81.58
2d	0.162	0.273	81.57	81.57
4d	0.126	0.223	81.57	81.57
Long term 7d	0.229	0.188	81.56	81.57
14d	0.123	0.182	81.56	81.57
21d	0.099	0.159	no data	81.54
28d	0.086	0.143	no data	81.50
42d	0.089	0.127	no data	81.31

PEC (ground water) (Annex IIIA, point 9.2.1)

Method of calculation and type of study (*e.g.* modelling, monitoring, lysimeter)	Modelling using FOCUS PELMO 3.3.2 with all 9 standard scenarios. Formation fraction of metabolite B: 56 %. Formation half-lives in soil: metabolite B 103.4 d, metabolite B-1 771.4 d. Formation fraction of metabolite B-1 from metabolite B: 14 %. No equilibrium between the metabolites. Standardised laboratory half-lives: chloridazon 57.3 d, metabolite B 108 d, metabolite B-1 144.6 d. K_{oc} values 199, 50, 27 for parent, metabolite B and B-1.
Application rate	2600 g as/ha, pre-emergence, no interception. - annually and – triannually (agricultural practice)
PEC$_{(gw)}$	
Maximum concentration	
Average annual concentration (Results quoted for modelling with FOCUS gw scenarios, according to FOCUS guidance)	80th percentile annual leachate concentrations at 1 m depth out of a 20 year simulation period were reported. (see detailed results in table below)

PEC(gw) - FOCUS modelling results

	Scenario annual application	Parent (µg/L)	Metabolite (µg/L)		
			Metabolite B	Metabolite B-1	
FOCUS-PELMO 3.3.2 / pre-emergence (sugar beets)	Châteaudun	0.007	45.223	16.168	
	Hamburg	0.008	57.025	19.867	
	Jokioinen	< 0.001	34.288	21.603	
	Kremsmünster	0.002	41.729	17.245	
	Okehampton	0.005	44.934	15.158	
	Piacenza	0.728	49.045	11.235	
	Porto	< 0.001	3.751	7.785	
	Sevilla	< 0.001	2.497	8.476	
	Thiva	< 0.001	20.710	14.489	

	Scenario triannual application	Parent (µg/L)	Metabolite (µg/L)		
			Metabolite B	Metabolite B-1	-
FOCUS-PELMO 3.3.2 / pre-emergence (sugar beets)	Châteaudun	0.001	13.576	5.274	
	Hamburg	0.001	15.975	6.453	
	Jokioinen	< 0.001	7.281	6.762	
	Kremsmünster	< 0.001	10.546	5.783	
	Okehampton	< 0.001	12.963	4.776	
	Piacenza	0.144	15.456	3.463	
	Porto	< 0.001	0.599	2.357	
	Sevilla	< 0.001	0.338	2.435	
	Thiva	< 0.001	4.332	4.421	

Fate and behaviour in air (Annex IIA, point 7.2.2, Annex III, point 9.3)

Direct photolysis in air ‡	Not studied, no data requested
Quantum yield of direct phototransformation	2.0×10^{-4} mol/Einstein
Photochemical oxidative degradation in air ‡	Tropospheric DT_{50} of chloridazon: < 7.0 h (derived by Atkinson (1987) method of calculation)
Volatilisation ‡	from plant surfaces: ‡ ≤ 1 % (BBA IV 6-1 guideline)
	from soil: ‡ ≤ 4 % (BBA IV 6-1 guideline)

PEC (air)

Method of calculation	Volatilisation highly unlikely, therefore no calculation performed.

$PEC_{(a)}$	
Maximum concentration	not applicable

Definition of the Residue (Annex IIA, point 7.3)

Relevant to the environment

Soil:	active substance and metabolite B
Water:	active substance and metabolite B
Groundwater:	metabolite B and metabolite B-1
Air:	-

Monitoring data, if available (Annex IIA, point 7.4)

Soil (indicate location and type of study)	Not available
Surface water (indicate location and type of study)	**Scheldt estuary:** Literature study: Monitoring study with systematic sampling from river end to ocean end considering the flush time of the estuary, 3 sampling times in June/July 1998, concentrations of chloridazon at river end: 0.09, 0.15, 0.08 µg/L decreasing towards the sea end of the estuary to 0.01 µg/L (LOQ 0.007 µg/L). **Portugal:** Literature study: Large scale, systematic surface water monitoring program of organic pollutants in portuguese rivers (14 months, 46 sampling points, monthly sampling); no detects of chloridazon in any sample (LOQ not given).
Ground water (indicate location and type of study)	Germany, groundwater monitoring programme number total / <LOQ / ≤0.1 / >0.1-1.0 / >1.0 µg/L 1999: 1446 / 1433 / 8 / 4 / 1 2000: 1482 / 1470 / 7 / 2 / 1 2001: 1425 / 1419 / 3 / 2 / 1 2002: 1701 / 1682 / 14 / 4 / 0 total: 6054 / 6004 / 32 / 12 / 3
Air (indicate location and type of study)	Not available

2.8.3.6 Appendix III.6: Chapter 6 (effects on non-target species)

Effects on terrestrial vertebrates (Annex IIA, point 8.1, Annex IIIA, points 10.1 and 10.3)

Acute toxicity to mammals ‡	LD_{50} = 2140 mg as/kg bw (female rat)
Long-term toxicity to mammals	NOAEL = 37 mg as/kg bw (rat, 2-generation study)*
Acute toxicity to birds ‡	LD_{50} = > 2000 mg as/kg bw (*Colinus virginianus*)
Dietary toxicity to birds ‡	LC_{50} = > 1318 mg as/kg bw (*Colinus virginianus*) > 5000 mg as/kg feed
Reproductive toxicity to birds ‡	NOAEL = 21.5 mg/kg bw (*Colinus virginianus*)* 300 mg as/kg feed

* ecologically relevant endpoint

Toxicity/exposure ratios for terrestrial vertebrates (Annex IIIA, points 10.1 and 10.3)

Application rate (kg as/ha)	Crop	Category (*e.g.* insectivorous bird)	Time-scale	TER	Annex VI Trigger
2.6	beets	herbivorous bird	acute	12	10
2.6	beets	herbivorous bird	short-term	20	10
2.6	beets	herbivorous bird	long-term	5.2	5
2.6	beets	insectivorous bird	acute	14	10
2.6	beets	insectivorous bird	short-term	20	10
2.6	beets	insectivorous (soil invertebrates) bird	long-term	6.3	5
2.6	beets	medium herbivorous mammal	acute	34	10
2.6	beets	medium herbivorous mammal	long-term	36	5

[1)] Application period pre-emergence or early post-emergence. Insectivorous birds will avoid uncovered fields

Toxicity data for aquatic species (most sensitive species of each group) (Annex IIA, point 8.2, Annex IIIA, point 10.2)

Group	Test substance	Time-scale	Endpoint	Toxicity (mg/L)
Laboratory tests				
Pseudokirchneriella subcapitata	chloridazon	72 h	EC_{50} biomass EC_{50} growth rate NOEC biomass (EC_{10}) NOEC growth rate (EC_{10})	0.6 > 3.0 (3.7[1)]) 0.1 0.42
Lemna gibba	chloridazon	7 d	EC_{50} frond no. EC_{50} growth rate NOEC frond no. NOEC growth	3.03 > 3.16 0.1 0.1
Daphnia magna	chloridazon	48 h	EC_{50} immobilisation	132
Oncorhynchus mykiss	chloridazon	96 h	LC_{50} mortality	41.3
Daphnia magna	chloridazon	21 d	NOEC reproduction (EC_{10})	6.23
Oncorhynchus mykiss	chloridazon	28 d	NOEC juvenile growth	3.16

Pseudokirchneriella subcapitata	product BAS 119 33H	72 h	EC_{50} biomass EC_{50} growth rate NOEC biomass (EC_{10}) NOEC growth rate (EC_{10})	0.99 (0.65 as) 4.01 (2.62 as) 0.24 (0.16 as) 0.73 (0.48 as)
Daphnia magna	product BAS 119 33H	48 h	EC_{50} immobilisation	79.5 (52.0 as)
Oncorhynchus mykiss	product BAS 119 33H	96 h	LC_{50} mortality	50.0 (32.8 as)
Pseudokirchneriella subcapitata	metabolite B[2)]	72 h	EC_{50} biomass EC_{50} growth rate NOEC biomass (EC_{10}) NOEC growth rate (EC_{10})	> 100 > 100 34.8 > 100
Daphnia magna	metabolite B	48 h	EC_{50} immobilisation	> 100
Oncorhynchus mykiss	metabolite B	96 h	LC_{50} mortality	> 100
Scenedesmus subspicatus	metabolite B-1[2)]	72 h	EC_{50} biomass EC_{50} growth rate NOEC biomass (EC_{10}) NOEC growth rate (EC_{10})	18.6 37.1 9.9 12.5
Daphnia magna	metabolite B-1	48 h	EC_{50} immobilisation	> 100
Oncorhynchus mykiss	metabolite B-1	96 h	LC_{50} mortality	> 100

[1)] extrapolated
[2)] data are requested for the evaluation of the validity criterion biomass increase.

Microcosm or mesocosm tests
study was not performed, not required

Toxicity/exposure ratios for aquatic organisms (Annex IIIA, point 10.2)

Chloridazon

Species	LC/EC_{50} [µg as/L]	Location*	Water body	PEC_{sw} Global max. [µg as/L]	TER_a	Trigger TER
Acute						
P. subcapitata (A. bibraianus)	600	D3	ditch	13.62	44	10
		D4	pond	2.082	288	
		D4	stream	11.46	52	
		R1	pond	1.332	450	
		R1	stream	19.26	31	
		R3	stream	130.9	5	
Daphnia magna	132000	D3	ditch	13.62	3031	100
		R3	stream	130.9	316	
O. mykiss	41300	D3	ditch	13.62	6989	100
		R3	stream	130.9	1009	
Long-term	NOEC [µg as/L]			$PEC_{sw\ twa}$ [µg as/L] **	TER_{lt}	
D. magna 21 d	6230	D3	ditch	0.661	9425	10
		R3	stream	5.48	1136	
O. mykiss 28 d	3160	D3	ditch	0.496	6371	10
		R3	stream	4.11	768	

* D scenarios: main routes of entry are spray drift and drainage
R scenarios: main routes of entry are spray drift and run-off
** only maximal values of R and D sceanrios are considered

Metabolite B

Species	LC/EC_{50} [µg as/L]	Location*	water body	PEC_{sw} Global max. [µg as/L]	TER_a	Trigger TER
Acute						
P. subcapitata *(A. bibraianus)*	600	D3	ditch	7.43	7340	10
		D4	pond	28.67	48031	
		D4	stream	14.99	8727	
		R1	pond	0.043	75075	
		R1	stream	0.858	5193	
		R3	stream	2.28	764	
Long-term	no tests performed, not required					

* D scenarios: main routes of entry are spray drift and drainage
R scenarios: main routes of entry are spray drift and run-off

Bioconcentration

Bioconcentration factor (BCF) ‡	not relevant, log Pow < 3 (no bioaccumulation potential
Annex VI Trigger:for the bioconcentration factor	not relevant
Clearance time (CT_{50}) (CT_{90})	not relevant
Level of residues (%) in organisms after the 14 day depuration phase	not relevant

Effects on honeybees (Annex IIA, point 8.3.1, Annex IIIA, point 10.4)

Acute oral toxicity ‡	as: > 200 µg/bee; formulation: > 200 µg/bee
Acute contact toxicity ‡	as: > 200 µg/bee; formulation: > 200 µg/bee

Hazard quotients for honey bees (Annex IIIA, point 10.4)

Application rate (kg as/ha)	Crop	Route	Hazard quotient	Annex VI Trigger
Laboratory tests				
2.6	sugar beet	oral	13	50
2.6	sugar beet	contact	13	50

Field or semi-field tests
-

Effects on other arthropod species (Annex IIA, point 8.3.2, Annex IIIA, point 10.5) ‡

Species	Stage	Test Substance	Dose (g as/ha)	Endpoint	Effect (%)	Annex VI Trigger
Laboratory tests: Standard tests on inert substrates						
Typhlodromus pyri	adult	product BAS 119 33 H	261.6	mortality/ reproduction	3.2/-3.8	30
			2616		36.8/43.6	
Aphidius rhopalosiphi	proto-nymphs	product BAS 119 33 H	2616	mortality/ reproduction	0 / 0	30
Chrysoperla carnea	larvae	product BAS 119 33 H	3924	mortality/ reproduction	7.1 / 0	30
Pardosa spec.	adult	product BAS 119 33 H	3924	mortality/ feeding capacity	0 / 0	30
Aleochara bilineata	adult	product BAS 119 33 H	3924	reproduction	4	30

Toxicity/exposure ratios for other arthropod species: in-crop scenario

Application rate (kg as/ha)	Test species	Test Substance	LR_{50} (g/ha)	in-crop HQ	Trigger*
2.6	*Aphidius rhopalosiphi*	product BAS 119 33 H	> 4000	< 1.0	2
	Typhlodromus pyri		4000	1.0	2

* according to SANCO/10329/2002

Toxicity/exposure ratios for other arthropod species: off-crop scenario

Application rate (kg as/ha)	Test species	Test Substance	PEC off-crop (g/ha)	Distance (m)	TER	Trigger *
2.6	*Aphidius rhopalosiphi*	product BAS 119 33 H	22.2	1	> 180	10
	Typhlodromus pyri				180	
	Chrysoperla carnea				> 270	
	Pardosa spec.				> 270	
	Aleochara bilineata				> 270	

* used by the German Federal Environmental Agency (Schulte et al., 1999: UWSF 11(5) 261-266)

Field or semi-field tests

no field test performed; data not required

Effects on earthworms (Annex IIA, point 8.4, Annex IIIA, point 10.6)

Acute toxicity ‡

Chloridazon	LC_{50} > 1000 mg /kg dry soil	
	NOEC 1000 mg /kg dry soil	
Metabolite B	LC_{50} > 1132 mg /kg dry soil	
	NOEC 1132 mg /kg dry soil	
Metabolite B-1	LC_{50} > 1000 mg /kg dry soil	
	NOEC 1000 mg /kg dry soil	
Product	LC_{50} > 1000 mg /kg dry soil	
NOEC 1000 mg /kg dry soil		

Reproductive toxicity ‡

Metabolite B	NOEC	15 mg/kg dry soil

Toxicity/exposure ratios for earthworms (Annex IIIA, point 10.6)

Application rate (kg as/ha)	Crop	Time-scale	TER	Annex VI Trigger
Chloridazon				
2.6	beets	acute	> 288	10
Metabolite B				
	beets	acute	> 1887	10
	beets	long-term	25	5
Metabolite B-1				
	beets	acute	> 5814	10
Product BAS 199 33 H				
2.6	beets	acute	> 188	10

Effects on soil micro-organisms (Annex IIA, point 8.5, Annex IIIA, point 10.7)

Nitrogen mineralisation ‡	Chloridazon: single application of 4 mg BAS 119 33 H/kg soil dw (2.6 mg as) caused no effect. 40 mg BAS 119 33 H/kg soil dw (26 mg as) no effect in loamy sand soil, 12 % inhibition in loamy soil. Metabolite B: single application of 1.71 mg or 8.53 mg/kg soil dw caused no significant effect in loamy sand soil and in sandy loam soil.
Carbon mineralisation ‡	Chloridazon: single application of 4 mg or 40 BAS 119 33 H/kg soil dw (2.6 mg or 26 mg as) caused no effect in loamy sand soil and in loamy soil. Metabolite B: single application of 1.71 mg or 8.53 mg/kg soil dw caused no significant effect in loamy sand soil and in sandy loam soil. Metabolite B-1: single application of 0.35 mg or 1.75 mg/kg soil dw caused no significant effect in silty sand soil.

Effects on soil macro-organisms (Annex IIIA, point 10.6.2)

Decomposition of organic matter (litter bag test)‡	not relevant

Impact on water treatment procedures (Annex IIA, point 8.7)

Oxygen consumption by activated sludge ‡	NOEC of oxygen consumption: 500 mg as/L 1000 mg as/L (nominal) highest test conc.: 29 % inhibition of respiration.

Effects on other non-target organisms (flora and fauna) (Annex IIA, point 8.6)

Species	Application rate (kg as/ha)	Test Substance	Parameter	Endpoint	Toxicity (kg/ha)	Toxicity (kg as/ha)	Trigger *
Terrestrial plants, growth test OECD 208, 21 days. Application pre-emergence with spraying							
Allium cepa *Avena sativa* *Brassica napus* *Helianthus annus* *Linum usitatissimum* *Pisum sativum*	2.6	product BAS119 33 H	mean plant weight and height NOER also for visual damage	NOER ER_{50}	6.0 > 6.0	3.92 > 3.92	50 % at max. applied rate
Terrestrial plants, growth test OECD 208, 21 days. Application post-emergence with spraying							
most sensitive species: *Brassica napus*	2.6	product BAS119 33 H	visual damage plant weight plant height plant weight	NOER NOER NOER ER_{50}	0.188 1.5 6.0 4.78	0.123 0.981 3.92 3.13	50 % at max. applied rate

* Trigger at maximum application rate according to SANCO/10329/2002

Toxicity/exposure ratio for terrestrial plants (most sensitive test) (SANCO/10329/2002)

Application rate (kg as/ha)	Test species	Test	Distance (m)	TER	Trigger (6 species)
Chloridazon					
2.6	*Brassica napus*	vegetative vigour	1	53	10

Level 3

Chloridazon

Proposal for the Decision

3 Proposed decision with respect to the application for inclusion of the active substance in Annex I

3.1 Background to the proposed decision

Chloridazon is the ISO common name for 5-amino-4-chloro-2-phenylpyridazin-3(2H)-one. The common used synomyms are pyrazon and BAS 119 H.

Data on application
A biological dossier is available. BAS 119 33 H acts as a systemic soil and leaf herbicide. The use of chloridazon and its formulations is solely in the agricultural field. When applied preplant incorporated, pre- or post-emergence, the compound selectively controls important annual broad-leaved weeds in sugar and fodder beets as well as in redbeet and mangels. The application of chloridazon is mostly pre-emergence with two post-emergence applications of soil and leaf herbicides to follow in order to provide weed and grass control over the whole season. The risk of developing resistance in target weeds when applying chloridazon is low.

Analytical methods for formulation analysis
Analytical methodology is available for the determination of the active substance and the impurities in the technical material as manufactured and for the active substance in the formulation.
The methods are validated. Concerning the impurities the linearity is only proven for the main impurity Reg No. 13 344.

Analytical methods for residue analysis
Validated analytical methods are available for the determination of chloridazon and the relevant metabolites in plant material, food of animal origin, soil, water and air. A confirmatory method for air is not available but is considered not to be necessary.
Additional data for confirmatory purposes are required for food of plant and animal origin.

Toxicology and metabolism
A full toxicology database, evaluating all toxicity endpoints required, was developed for chloridazon. Clear no effect levels have been determined for all treatment related effects.

Chloridazon is of low acute oral, dermal and inhalation toxicity, is not irritant to eyes or skin and has no skin sensitising properties. No acute effects have been observed after single exposure in repeat-dose studies. Considering the low acute toxicity of the active substance and its use patterns, the establishment of an acute reference dose is not considered necessary.

The main findings in short-term oral toxicity studies were dose-dependent effects on body weight and liver in rats, mice and dogs and kidney toxicity and effects on the gastric mucosa in dogs at very high dose levels.

Chloridazon has no mutagenic and genotoxic potential.

Long-term studies in rats and mice identified liver, blood and sceletal muscle as target organs. No evidence of an oncogenic potential of chloridazon was found in rat or mouse long-term feeding studies.

Chloridazon is not teratogenic, has no effects on fertility and is not neurotoxic.

The metabolites B and B-1 with a high leaching potential (see below) were tested in further toxicological studies. These studies revealed that both metabolites can be considered as toxicologically not relevant.

The estimated operator exposure does not present an undue risk. In view of a single rather than a repeated scenario as it is the situation of field applicators, it is not likely that the potential exposure of bystanders will exceed the proposed systemic AOEL of 0.2 mg/kg bw/day.

Residue data

The residue behaviour of chloridazon has been investigated in metabolism studies on sugar beet plants. In a sufficient number of supervised residue trials the residue situation was investigated in sugar beets in growing areas in the northern and southern part of Europe. Also residues in red beets and onions were quantified in supervised trials under northern European conditions. In these trials WP or WG and SC formulations were used in sugar beets and red beets and a WG formulation in onions. At normal harvest residues of chloridazon in edible crop parts of beets and onions were found at levels below 0.2 mg/kg. Residues in beet leaves reach values of up to 1.5 mg/kg. To derive an MRL proposal for chard this data were used for extrapolation. Analytical methodology also appropriate for monitoring has been applied in these trials. This residue situation which leads to the MRL proposals of the tested crops is regarded to be acceptable if the plant protection products containing chloridazon will be used properly. Health risks for consumers caused by residues in food of plant origin following treatment with the active substance are not expected.

Environmental fate and ecotoxicology

Regarding fate and behaviour in the environment chloridazon is degraded in soil with DT_{50} values between 8.6 days (20 °C) and 187.6 days (25 °C). The corresponding half-lives normalised to reference conditions according to FOCUS are in a similar order of magnitude, ranging from 8.6 to 173.9 days with a geometric mean of 43.1 days. The field DT_{50} values for chloridazon range between 3 and 78.5 days. The value of 78.5 days observed in Sweden is proposed as a realistic worst-case field half life. The field degradation rates demonstrate that the major metabolite B is more stable in soil than chloridazon itself.

For the metabolite B, DT_{50} values range between 80 and 132 days in the laboratory and 130 to 359.5 days in the field. For the metabolite B-1 the DT_{50} values range between 118 and 170 days in the laboratory. Metabolite B appeared in the different trials in the top soil layers from 0-10 cm in maximum amounts of 0.448 mg/kg after 64 DAT. In the field the minor metabolite B-1 is generally found only in lower quantities of max. 0.033 mg/kg in the 0 – 10 cm soil layer in some samples and mostly after longer periods of time after application.

PEC_{gw} has been calculated according to FOCUS. The active substance is predicted to exceed 0.1 µg/L in one scenario. Both metabolites B and B-1 have a high leaching potential. With annual application FOCUS modelling resulted in concentrations up to 57 µg/L and 22 µg/L for B and B-1, respectively. For applications every third year up to 16 µg/L were predicted for B and up to 7 µg/L for the metabolite B-1. Results of FOCUS modelling are confirmed by lysimeter studies performed in Germany. Following application of 2.5 kg as/ha annual average concentrations of < 0.1 µg/L were found for chloridazon. The metabolite B exceeded 0.1 µg/L in both years with a maximum annual average concentration of 40 µg/L in the

second year. Metabolite B-1 was generally detected in the lysimeter in much lower concentrations than metabolite B ranging between 0.13 µg/L and 2.12 µg/L in sandy soil.

Both metabolites revealed no herbicidal activity in comparison to the parent compound and are considered not relevant with regard to the toxicological properties. In addition to that, the ecotoxicological studies indicate that the metabolites are not of ecotoxicological concern for groundwater.
Provided that an application takes place every third year, an inclusion into Annex I can be proposed as the concentration of chloridazon does not exceed 0.1 µg/L in 8 of 9 scenarios and the concentrations of the metabolites B and B-1 do not exceed 10 µg/L in 4 and 9 scenarios, respectively (see guidance document on the assessment of the relevance of metabolites in groundwater of substances regulated under council directive 91/414/EEC, Sanco/22/2000). MS should pay particular attention to the protection of groundwater when assessing applications for national authorisations.

According to the recommended use pattern the risk for birds and mammals, non-target arthropods, earthworms, other soil macro-organisms, soil micro-organisms and non-target plants is considered acceptable. Concerning effects of chloridazon on aquatic organisms algae are the most sensitive group. The biomass EC_{50} of the active substance for *Pseudokirchneriella subcapitata* was 0.6 mg/L. The acute and long-term TER values for daphnids and fish meet the standard triggers of Directive 91/414/EEC considering spray applications and drainage or run-off of chloridazon according to the FOCUS scenarios. The data indicate a potential risk only for algae at the stream location R3.
Due to the low lipophilicity of the active substance chloridazon ($logP_{ow} < 1.2$) it is concluded that there is no risk of bioaccumulation in food chains.

3.2 Proposed decision concerning inclusion in Annex I

[redacted]

3.3 Rationale for the proposal of inclusion of the active substance in Annex I

[redacted]

[redacted]

The information in sections 3.2 and 3.3 has been removed upon request by the EU Commission as it relates to risk management recommendations or proposals.

Level 4

Chloridazon

Demand for Further Information

4 Further information to permit a decision to be made, or to support a review of the conditions and restrictions associated with the proposed inclusion in Annex I

4.1 Data which are necessary for an unrestricted inclusion in Annex I of Council Directive 91/414/EEC

Identity of the active substance
None.

Physical and chemical properties of the active substance
None.

Data on application and further information
None.

Classification and labelling
None.

Methods of analysis
Analytical methods for formulation analysis
Annex IIA, point 4.1.3.2:
Linearity for all specified impurities.
Justification:
Linearity is only proven for the main impurity Reg. No. 13.344.

Analytical methods for residue analysis
Annex IIA, point 4.2.1
For food of plant and animal origin: method validation data of a second transition for the HPLC-MS/MS methods or other confirmatory methods according to the residue definition.
Justification:
HPLC-MS/MS with only one transition is not sufficient for simultaneous confirmation of a positive result.

Toxicology and metabolism
None.

Residue data
None.

Environmental fate and behaviour
None.

Ecotoxicology
None.

4.2 Data which should be submitted for an assessment on Member State level

Identity of the active substance
None.

Physical and chemical properties of the active substance
None.

Data on application and further information
None.

Classification and labelling
None.

Methods of analysis
Analytical methods for formulation analysis
None.

Analytical methods for residue analysis
None.

Toxicology and metabolism
In the specification of the technical material, maximum contents were proposed for three impurities (impurity #4: 2 g/kg, impurities #9 and #10: 1 g/kg each, for details see Document J) by the applicant. However, these impurities were neither detected in the five-batch-analysis nor a proof was submitted that they had been present in relevant amounts in the batches used for toxicity testing.

Formally, this situation was seen as being similar to the assessment of equivalence of two technical materials with different impurity contents. It was therefore dealt with by applying the principles laid down in the 'Draft Guidance Document on the Assessment of the Equivalence of Technical Materials of Substances Regulated under Council Directive 91/414/EEC' (SANCO/10597/2003-rev. 2, of May 21, 2004) as well as the position of the RMS towards this document, which has not been finalised yet.

Beside other criteria, a new technical material can only be seen as equivalent, if no new impurities that are both significant and relevant are contained beyond a tolerable level (they must not be contained at all, if no such level exists).

In accordance with Directive 91/414/EEC, an impurity is seen as significant, if it is present in the technical material at levels ≥ 1 g/kg; this holds true for all three impurities under question.

A relevant impurity would be one of (eco)toxicological concern, i. e. its presence would negatively affect the toxicological profile (characterised by classification and labelling as well as by the reference values derived, such as ADI, AOEL, and ARfD) of the new technical material as compared to that of the original one.

However, following the procedures laid down in the guidance document by performing a review of existing toxicological information about the impurities under question, a

toxicological relevance of these three compounds could neither be ascertained nor excluded. In this case, the guidance document states that for every impurity present at levels between 1 and 10 g/kg, at least an Ames test should be performed.

In conclusion, the applicant is requested to

- submit all available toxicological information on the three impurities (in-house data, data from the literature, (Q)SARs) as well as

- perform and provide data on an Ames test for each of the impurities #4, #9 and #10. This demand might be waived, if the applicant is able to provide evidence that these three impurities were present in relevant amounts in those batches which have been used in the submitted mutagenicity tests with chloridazone.

Residue data
None.

Environmental fate and behaviour
None.

Ecotoxicology
None.