Attachment 3 305

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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OFFICE OF
PREVENTION, PESTICIDES, AND
TOXIC SUBSTANCES

OPP OFFICIAL RECORD
HEALTH EFFECTS DIVISION
SCIENTIFIC DATA REVIEWS
EPA SERIES 361

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MEMORANDUM

February 10, 2003

SUBJECT: **Clothianidin:** Tier I Drinking Water EECs for Use in the Human Health Risk Assessment.

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This memo summarizes the Tier I estimated environmental concentrations (EECs) for clothianidin in surface water and in ground water for use in the human health risk assessments. The EECs are summarized in Table 1. EFED used the simulation model FIRST to calculate the surface water EECs and used the simulation model SCI-GROW to calculate the groundwater EEC. Clothianidin is a new chemical, therefore monitoring data were not available.

For the surface water and ground water assessments, the application rates for the seed treatments to both canola and corn were modeled, with the canola use provided the highest exposure numbers for surface water and the corn use providing the highest exposure numbers for ground water. Since seed treatment uses are not expressed on the registration labels as lbs ai per acre, assumptions had to be made regarding the total pounds of seeds applied per acre in order to calculate the pesticide application rates used for model input; the effective maximum application rates were determined to be 0.05 and 0.10 lb ai/A for canola and corn, respectively. Exposure would be expected to be higher should additional uses involving direct field application of clothianidin be registered, since such uses typically involve application of significantly more active ingredient per acre. A summary of the model input parameter values used in FIRST is presented in Table 2. The FIRST output file is located in Attachment 1. A summary of the model input parameter values used in SCI-GROW is presented in Table 3. The SCI-GROW output file is located in Attachment 2.

Some degradates, such as TZNG, TZMU, and MNG were found to persist to the extent they were formed in aerobic soil (only partial degradation of parent clothianidin occurred in these studies). Inclusion of these degradates in simulations with both FIRST and SCI-GROW would

somewhat increase the overall exposure levels, although not greatly, because of the already high persistence of parent clothianidin alone.

Table 1. Estimated Tier 1 concentrations of clothianidin in drinking water.

Chemical	Surface Water (ug/L)		Groundwater (ug/L)
	Acute	Chronic	Acute and Chronic
Clothianidin	3.97	1.06 - 2.14	1.46

Table 2. Environmental Fate model input values used with FIRST. Use of clothianidin as a seed treatment

Using model version dated 08/05/01 and input selection guidance dated 02/28/02.			
Input	**Value**	**Source**	**Comments**
Run #	1, 3, 4 (corn) 2 (canola)	Reviewer's choice	
Output File name	FIRST_CLOTHI2.TXT	Reviewer's choice	
Chemical name	Clothianidin	NA	Also known as TI-435.
Crop name	Corn	Proposed label	Seed treatment
	Canola		
Application rate (lb ai/acre)	0.1	Proposed label treatment rate of 1.25 mg ai/ corn seed	Based on seeding density of 90,000 seeds per hectare (MRID 45422423 - field toxicity effects on birds) - converts to 36,400 seeds per acre
	0.05	Proposed label maximum treatment rate of 0.6 kg ai/ 100 kg canola seed	Based on seeding rate of approximately 8 kg seed per hectare (MRID 45422424 - field toxicity effects on birds)
% Crop Treated	47 (Corn)	Input guidance	Estimated maximum percentage of watershed likely to be planted to corn.
	87 (Canola)	Input guidance	Default value based on maximum percent of watershed likely to be in agricultural production.

Soil aerobic metabolic half-life (days)	744	MRIDs 45422325 & 45422326	Calculated per guidance for n = 9
Pesticide wetted in? (Yes/no)	No	NA	Not applicable to seed treatment
Method of application	Granular	NA	Seed treatment use is treated as granular for purposes of FIRST.
Incorporation depth (inches)	2	corn	Based on planting depth of 4-5 cm (MRID 45422423 - field toxicity effects on birds)
	0.5	canola	Based on planting depth of 1 cm (MRID 45422519 - laboratory toxicity effects on spiders)
Solubility (ppm)	300	MRID 45422317	Solubility stated as 300 mg/L
Aquatic metabolic half-life (days)	1488	MRID 45422324	Calculated per guidance for n = 2
Aquatic photolysis half-life (days)	1.10 to 34[1]	MRID 45422323 (soil); 45422318, 45422320, & 45422322, 45422319, 45422321 (water)	Longest half-life of 34 days used instead of aqueous photolysis half-life because of demonstrated persistence in water and on soil surface exposed to sunlight. Lower value of 1.1 days used from natural water photolysis study.

[1]The range of values given for surface water-source drinking water represents uncertainty with regard to the importance of photodegradation in the long-term fate of clothianidin in natural waters. Additional data may be needed from the registrant to resolve these uncertainties.

Table 3. Environmental fate input parameters for clothianidin in SCI-GROW

Using model version dated 08/01/01 and input selection guidance dated 02/28/02.		
Parameter	**Clothianidin**	**Source**
Application rate (lb ai/acre)	0.1	Proposed label treatment rate of 1.25 mg ai/ corn seed
Organic Carbon Partition Coefficient (Koc)	84	MRID 45422311. Minimum value calculated per guidance for pesticides with widely varying Kocs.
Aerobic Soil Metabolism Half-Life (days)	533	MRIDs 45422325 & 45422326. Median value calculated per guidance for pesticides with aerobic metabolism studies in more than 4 soils.

ATTACHMENT 1: FIRST Files

RUN No. 1 FOR Clothianidin ON Corn * INPUT VALUES *

Using 34-day photolysis half-life, 1488-day aerobic aquatic half-life.

RATE (#/AC) ONE(MULT)	No.APPS & INTERVAL	SOIL Koc	SOLUBIL (PPM)	APPL TYPE (%DRIFT)	%CROPPED AREA	INCORP (IN)
.100(.100)	1 1	84.0	300.0	GRANUL(.0)	46.0	2.0

FIELD AND RESERVOIR HALFLIFE VALUES (DAYS)

METABOLIC (FIELD)	DAYS UNTIL RAIN/RUNOFF	HYDROLYSIS (RESERVOIR)	PHOTOLYSIS (RES.-EFF)	METABOLIC (RESER.)	COMBINED (RESER.)
744.00	2	N/A	-34.00--4216.00	******	1488.00

UNTREATED WATER CONC (MICROGRAMS/LITER (PPB)) Ver 1.0 AUG 1, 2001

PEAK DAY (ACUTE) CONCENTRATION	ANNUAL AVERAGE (CHRONIC) CONCENTRATION
2.099	1.164

RUN No. 2 FOR Clothianidin ON Canola * INPUT VALUES *

Using 34-day photolysis half-life, 1488-day aerobic aquatic half-life.

RATE (#/AC) ONE(MULT)	No.APPS & INTERVAL	SOIL Koc	SOLUBIL (PPM)	APPL TYPE (%DRIFT)	%CROPPED AREA	INCORP (IN)
.050(.050)	1 1	84.0	300.0	GRANUL(.0)	87.0	1.0

FIELD AND RESERVOIR HALFLIFE VALUES (DAYS)

METABOLIC (FIELD)	DAYS UNTIL RAIN/RUNOFF	HYDROLYSIS (RESERVOIR)	PHOTOLYSIS (RES.-EFF)	METABOLIC (RESER.)	COMBINED (RESER.)
744.00	2	N/A	34.00- 4216.00	******	1099.83

UNTREATED WATER CONC (MICROGRAMS/LITER (PPB)) Ver 1.0 AUG 1, 2001

PEAK DAY (ACUTE) CONCENTRATION	ANNUAL AVERAGE (CHRONIC) CONCENTRATION
3.969	2.140

RUN No. 4 FOR Clothianidin ON Canola * INPUT VALUES *

Using 1.10 day photolysis half-life, 1488-day aerobic aquatic half-life.

RATE (#/AC) ONE(MULT)	No.APPS & INTERVAL	SOIL Koc	SOLUBIL (PPM)	APPL TYPE (%DRIFT)	%CROPPED AREA	INCORP (IN)
.050(.050)	1 1	84.0	300.0	GRANUL(.0)	87.0	1.0

FIELD AND RESERVOIR HALFLIFE VALUES (DAYS)

METABOLIC (FIELD)	DAYS UNTIL RAIN/RUNOFF	HYDROLYSIS (RESERVOIR)	PHOTOLYSIS (RES.-EFF)	METABOLIC (RESER.)	COMBINED (RESER.)
744.00	2	N/A	.14- 17.36	******	17.16

UNTREATED WATER CONC (MICROGRAMS/LITER (PPB)) Ver 1.0 AUG 1, 2001

PEAK DAY (ACUTE) CONCENTRATION	ANNUAL AVERAGE (CHRONIC) CONCENTRATION
3.969	1.058

ATTACHMENT 2: SCI-GROW File

SCI-GROW Model Output:

SCIGROW

VERSION 2.2: NOVEMBER 1, 2001

RUN No. 1 FOR Clothianidin ** INPUT VALUES **

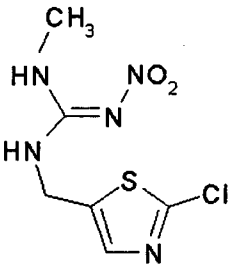
APP RATE (LBS/AC)	APPS/ YEAR	TOTAL/ SEASON	SOIL KOC	AEROBIC SOIL METAB HALFLIFE (DAYS)
.100	1	.100	84.0	533.00

GROUND-WATER SCREENING CONCENTRATION (IN UG/L - PPB)

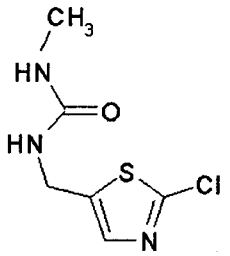
1.455433

ATTACHMENT 3: Clothianidin and its Degradates Mentioned in this Memorandum

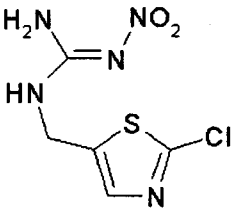
Parent TI-435
Clothianidin



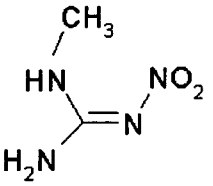
Degradate 1
TZMU
N-(2-chloro-5-thiazolyl-methyl)-N'-methylurea
(aka TI-435 urea)



Degradate 2
TZNG
N-(2-chloro-5-thiazolyl methyl)- *N'*-nitroguanidine (aka desmethyl TI435)



Degradate 16
MNG
N-methyl-N'-
nitroguanidine



13544

R158323

Chemical: Clothianidin

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