12-6-91

DP Barcode: D159382

Shaughnessy No.: 128834

Date Out: DEC 6 1991

To: Robert Taylor
Product Manager #25
Registration Division (H7505C)

From: Paul Mastradone, Chief
Environmental Chemistry Review Section #1
Environmental Fate and Ground Water Branch/EFED (H7507C)

Through: Henry Jacoby, Chief
Environmental Fate and Ground Water Branch/EFED (H7507C)

Attached, please find the EFGWB review of . . .

Reg./File # : 042545-LO, 42545-LE, 42545-LG and petition No. 8F3603

Common Name : Pyridate.

Type Product : Herbicide.

Product Name : Lentagran, Pyron, Tough.

Company Name : Agrolinz Inc.

Purpose : Review of photodegradation in water, photodegradation on soil, and mobility (aged, unaged, and lysimeter) studies.

Date Received: 12/17/90 EFGWB # (s): 91-0275

Action Code : 100 NC-Food/Feed Use

Deferrals to:

_____ Ecological Effects Branch, EFED

_____ Science Integration and Policy Staff, EFED

_____ Occupational and Residential Branch, HED

_____ Dietary Exposure Branch, HED

_____ Toxicology Branch I, HED

_____ Toxicology Branch II, HED

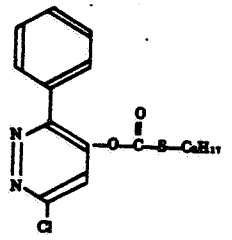
1. CHEMICAL: Common name: Pyridate.

Chemical name:

O-(6-Chloro-3-phenyl-4-pyridazinyl)-S-octyl-carbonothioate.

Trade name(s): Lentagran, Pyron, Tough.

Structure:



Formulations: Emulsifiable concentrate, wettable powder.

Physical/Chemical properties:

Molecular formula:	$C_{19}H_{23}ClN_2O_2S$.
Molecular weight:	378.9.
Physical state:	Colorless crystalline solid.
Melting point:	27°C.
Vapor pressure :	133 nPa.
Solubility (20°C):	1.5 mg/L water; highly soluble in organic solvents.

2. TEST MATERIAL:

Studies 1-3: Active ingredient.
Study 4: Wettable powder; and Formulation not identified.

3. STUDY/ACTION TYPE:

Review of photodegradation in water, photodegradation on soil, and mobility (aged, unaged, and lysimeter) studies.

4. STUDY IDENTIFICATION:

Mittelstaedt, W. 1990. Outdoor lysimeter study with ^{14}C-pyridate in two silty loam soils. Laboratory Project ID: Project No. IRA 7/89. Unpublished study performed by Institute for Radioagronomie, Julich, Germany, and submitted by Agrolinz Inc., Memphis, TN. (41706404c)

Zohner, A. 1990. Aqueous photolysis study on ^{14}C-pyridate. Laboratory Project ID: Project M8828; Report 940-2. Unpublished study performed by Agrolinz Agrarchemikalien Ges, Linz, Austria, and submitted by Agrolinz, Inc., Memphis, TN. (41706401)

Zohner, A. 1990. Determination of ^{14}C-pyridate residues in the percolate of a 2 year lysimeter trial on two different soils.

Laboratory Project ID: Project M8920; Report No. 1009. Unpublished study performed by Agrolinz Agrarchemikalien Ges, Linz, Austria, and submitted by Agrolinz Inc., Memphis, TN. (41706404d)

Zohner, A. 1990. Determination of the mobility of ^{14}C-pyridate in four different soils by soil column leaching test. Laboratory Project ID: M9001; Report No. 1061. Unpublished study performed by Agrolinz Agrarchemikalien Ges, Linz, Austria, and submitted by Agrolinz Inc., Memphis, TN. (41706403)

Zohner, A. 1990. Determination of the mobility of soil-aged ^{14}C-pyridate residues (Summary Document). Report No. 1060. Laboratory Project ID: Attachment 1: Project M8605; Attachment 2: Project IRA 7/89; Attachment 3: Project M8920. Unpublished study performed by Agrolinz Agrarchemikalien Ges, Linz, Austria, and submitted by Agrolinz Inc., Memphis, TN. (41706404a)

Zohner, A. 1990. Determination of the mobility of soil-aged ^{14}C-pyridate residues on 4 soils by soil column leaching test. Laboratory Project ID: Project M8605; Report No. 877-1. Unpublished study performed by Agrolinz Agrarchemikalien Ges, Linz, Austria, and submitted by Agrolinz Inc., Memphis, TN. (41706404b)

Zohner, A. 1990. Photodegradation study of ^{14}C-pyridate on a silty loam soil. Laboratory Project ID: Project M8829; Report 942-1. Unpublished study performed by Agrolinz Agrarchemikalien Ges, Linz, Austria, and submitted by Agrolinz Inc., Memphis, TN. (41706402)

5. REVIEWED BY:

Richard Mahler
Hydrologist
EFGWB/EFED/OPP
Review Section #1

Signature: Richard J. Mahler

Date: DEC 6 1991

6. APPROVED BY:

Paul Mastradone
Chief
EFGWB/EFED/OPP
Review Section #1

Signature: Paul J Mastradone

Date: DEC 6 1991

7. CONCLUSION:

The following Environmental Fate studies are fulfilled:

HYDROLYSIS--161-1
AEROBIC SOIL METABOLISM--162-1
LEACHING/ADSORPTION/DESORPTION-163-1
CONFINED ACCUMULATION IN ROTATIONAL CROPS--165-1
ACCUMULATION IN FISH--165-4

The following studies are required to satisfy the Subdivision N Environmental Fate Data Requirements for use on terrestrial food crops only:

AQUEOUS PHOTODEGRADATION[1]--161-2
SOIL PHOTODEGRADATION--161-3
ANAEROBIC SOIL METABOLISM--162-2
FIELD DISSIPATION--164-1

EFGWB granted a waiver (see EFGWB review dated 12/15/88), that no further volatility data were required, based on the results of a vapor pressure study which demonstrates a very low volatility of pyridate and its main degradate CL-9673 (pyridate, 7.49 x 10^{-9} torr and CL-9673, 4.29 x 10^{-9} torr).

The following additional studies may be required if the registrant seeks registration for use on rice:

ANAEROBIC AQUATIC--162-3
AEROBIC AQUATIC--162-4
AQUATIC FIELD DISSIPATION--164-1
ACCUMULATION IN IRRIGATED CROPS--165-3

The following studies are reserved based on the results of other required studies:

LONG TERM SOIL DISSIPATION--164-5
FIELD ROTATIONAL CROPS--165-2
ACCUMULATION IN AQUATIC NON-TARGET ORGANISMS--165-5

ENVIRONMENTAL FATE, GROUND WATER LEACHING AND SURFACE RUNOFF ASSESSMENT

Since available data are insufficient, final environmental fate, ground water leaching and surface runoff assessments cannot be made; however, based on acceptable, partially and unacceptable studies, a preliminary environmental fate assessment is possible:

Acceptable Studies

Pyridate hydrolyses rapidly (half-lives 66.7, 17.8, and 6.8 hours at pH 5, 7, and 9) to CL-9673. The degradate CL-9673 degrades in soil under aerobic conditions with half-lives ranging from 10-30 days (the major degradate is 3-phenyl-4-methoxy-6-chloropyridazine).

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[1] EFGWB notes that this data requirement is partially fulfilled and that no further information is needed at the present time related to the aqueous photolysis of pyridate. However, to completely satisfy the data requirements, further information is needed on the aqueous photolysis of CL-9673, the primary degradate of pyridate. See the attached DER for Study 1 for further details.

Based on batch equilibrium studies, it appears that CL-9673 (the primary degradate of pyridate), readily leaches (Freundlich K_d values 0.3-3.45). Aged and unaged column leaching studies indicate that, of the applied radioactivity, $\leq$0.83 % and between 1-67% (dependent on the soil), respectively, of parent pyridate and CL-9673 were detected in the leachates, indicating little leaching of parent pyridate. Apparently, as has been previously noted above, pyridate hydrolyzes so rapidly to CL-9673, there is little opportunity for parent pyridate to remain intact in soil to be subject to leaching.

In the confined rotational crops study, no residues were detected in lettuce or carrots above the detection limit of 0.01 ppm equivalent CL-9673. However, residues were detected in barley straw and grain, which the authors attributed to ^{14}C residues being incorporated into the cell tissue (i.e., carbon pool of the plant).

The fish accumulation study indicates that pyridate plus CL-9673 bioaccumulated in bluegill sunfish with a BCF of 116 for whole fish, but 99% of the accumulated ^{14}C is eliminated from the fish in 14 days upon depuration.

Partially Acceptable Studies

Pyridate does not undergo any apparent aqueous photolysis, but instead is rapidly hydrolyzed (half-life <1 day at pH 5, 7 and 9) to CL-9376 which is readily photolyzed (half-life between <1 day to 29 days in non-sensitized water buffered at pH 5, 7 or 9. In sensitized and buffered water the half-life was 1.7 to 2.5 days in solutions at the same pH values, indicating that CL-9673 would be expected to have an expected half-life of only two or three days in bodies of water containing natural sensitizers.

Unacceptable Studies

An anaerobic soil metabolism study revealed a half-life of 675 days for CL-9673. In the aerobic aquatic metabolism study, which was conducted in the dark, and judged to be supplemental, CL-9673 degraded with a half-life of approximately 75 days; however, since formation and decline of CL-9673 were concurrent, an accurate half-life cannot be calculated.

Available data from four field dissipation studies indicated that 50% of CL-9673 remained after 12, 28, 29 and 122 days.

The data in the soil photolysis study showed that pyridate hydrolyzed rapidly, even in dry soil, to CL-9673. CL-9673 is then photodegraded with to a series of transitory highly polar compounds.

In summary, the available data indicate that the parent pyridate probably does not have the potential to leach to ground water or to undergo surface runoff, since it is so rapidly hydrolyzed to CL-9673. Conversely, CL-9673 appears to have the potential to leach to ground water and undergo surface runoff, since it is not bound tightly by soil

as indicated by K_d values of 0.3 to 3.45; and is moderately persistent in soil as demonstrated by half-lives in soil of 10-30 days (aerobic metabolism), 675 days (anaerobic metabolism) and 12 to 122 days (field dissipation). It appears from the limited amount of submitted data that CL-9673 probably is not stable in natural water bodies since it can undergo rapid aqueous photolysis.

8. RECOMMENDATIONS:

Inform the registrant of the data deficiencies identified in each of the submitted studies which do not completely satisfy the data requirements (161-2--photodegradation in water and 161-3--photodegradation on soil).

Specific deficiencies are listed in the attached individual Data Evaluation Records (DERs).

9. BACKGROUND:Registration Division has requested EFGWB review four studies submitted in support of the registrants application for new chemical registration of pyridate.

Pyridate is a postemergent contact (foliar-acting) herbicide that is currently used in Europe and Asia to control broadleaf and some grassy weeds in cereals, rice, corn, peanuts, cole crops, alfalfa, turf, grassland, chickpeas, oil-seed rape, asparagus, orchards, vineyards, forest nurseries, onions and poppy. Single active ingredient formulations include emulsifiable concentrate and wettable powder. Multiple active ingredient formulations include methazole, bromoxynil, atrazine, clopyralid, and ioxynil. It is believed that the herbicide acts by inhibiting the Hill reaction of photosynthesis. An EUP was granted in 1987.

10. DISCUSSION OF INDIVIDUAL TESTS OR STUDIES: Refer to attached reviews.

11. COMPLETION OF ONE-LINER: The information contained in these reviews has been added to the one-liner, if appropriate.

12. CBI APPENDIX: All data reviewed here are considered "company confidential" by the registrant and must be treated as such.