DATA EVALUATION RECORD

STUDY 7

CHEM 129016 XRD-498 §164-1

STUDY ID 41931735

Lehmann, R.G.; Balcer, J.L.; Duebelbeis, D.O.; Flora, E.A.; Foster, D.R.; Harnick, B.J.; Olberding, E.L.; Swanson, M.; and Wray, M.W. TERRESTRIAL FIELD DISSIPATION OF DE-498. Preformed and Submitted by DowElanco; Midland, MI under Laboratory Project ID ENV87034/AN and ENV88075/AN; Study completed on 12 June 1991; Received by EPA 19 June 1991.

DIRECT REVIEW TIME = 1.6 day

REVIEWED BY: G. Maske
TITLE: Chemist
ORG: EFGWB/EFED/OPP
TEL: 557-8245

SIGNATURE:

APPROVED BY: Paul Mastradone, Chief
Supervisory Chemist
Review section #1
OPP/EFED/EFGWB

Signature: Paul J. Mastradone

Date:

CONCLUSIONS:

The terrestrial field dissipation study is not acceptable to meet Subdivision N Data Requirement for the following reasons:

The data was reported in terms of total residues. The degradate(s) was not characterized.

The pattern of decline and formation of parent and degradate(s) were not addressed.

A new terrestrial field dissipation study is required to fulfill the data requirement which addresses the above deficiencies. A much higher application rate probably would be required for this study.

XRD-498 had reported half-lives of 1.5 months, <1 week, 3 months, and 1.5 months when applied to sandy clay loam soil in Midland, MI; silty clay loam soil in Geneseo, IL; silt loam in Wayside, MS; and silt loam in Burdette, MS, respectively. XRD-498 did not leach at Geneseo and Wayside (See Tables IV and V), despite ample rainfall during the testing period. Trace leaching (<5 ppb) to 18" of soil depth at Midland was found (See Table III), while XRD-498 moved more apparently through the soil profile at Burdette, with levels of 7 ppb in the 12-18" soil depth samples after 2 weeks, and an isolated detection <2.5 ppb in the 3-4 foot soil depth samples after 3 months (See Table VI). In summary, in well drained, low organic matter soil with rainfall shortly after application, XRD-498 may exhibit some leaching in the soil. Additionally, XRD-498 appears to degrade faster in soils with higher pH and lower organic carbon content.

MATERIALS AND METHODS:

Test Material: XRM-4950R of which XRD-498 constituted 12.15% by weight. The density of the formulation was 1.06 g/mL, the concentration of the formulation was thus: 0.1215 x 1.06 g/mL = 0.129 g XRD-498 which corresponds to about 1.08 pound ai/gal.

The XRM-4950R formulation used in Burdette, MS constituted 12.55% by weight. Using a formulation density of 1.06 g/mL, the concentration of XRD-498 was 0.133 g/mL, which corresponds to abound 1.11 pound ai/gal.

Standards: Standards were prepared from a 98% pure reference.

Soil: See Appendices E, F, G, and H.

Sampling: Midland, MI-pre-treatment, 0 day, day 3, day 7, day 14, day 28, day 39, day 119, day 288, and day 534 posttreatment.

Geneseo, IL-pre-treatment, 0 day, day 3, day 7, day 14, day 28, day 40, day 80, day 119, day 286, day 361, and day 545 posttreatment.

Wayside, MS-pre-treatment, 0 day, day 3, day 7, day 13, day 28, day 41, day 79, day 120, day 206, day 360, and day 539 posttreatment.

Burdette, MS-pre-treatment, 0 day, day 3, day 7, day 14, day 28, day 40, day 80, day 105, day 118, day 199, day 370, day 447, and day 563 posttreatment.

METHODOLOGY:

Each of the four locations (Midland, MI; Geneseo, IL; Wayside, MS; and Burdette, MS) had six representative plots. Three of these were treated with XRM-4950R, and three were used for controls. A tractor/sprayer combination was used to apply the herbicide. The sprayer contained 4 or 6 nozzles arranged every 20 inches along a 6.7 or 10 foot boom. The sprayer was set to deliver 20 gallons/acre or 1 pint ai/acre.

This is approximately twice the highest label rate of application (79 g/ha) of XRD-498. Application rates varied slightly among the four locations (Appendices A, B, C, and D). An average soil concentration at time 0, using an average soil density of 1.35 g/cm^3, should be about 0.074 ppm.

Applications were pre-emergence at Geneseo, Wayside, and Burdette, but post-emergence at Midland. The plots were planted with soybeans. After the first year, the rectangle containing the 3 treated plots was divided into 2 equal regions: In one of the regions, soil sampling was continued for the short term study (164-1), while the other region was retreated with XRM-4950R for the long term study (164-5). However, the long term study was not necessary due to the rapid dissipation of XRD-498 in the short term study.

Samples were taken immediately following application, 0 day, and at various times throughout the growing season, as well as during the following growing season. A metal tube with an inner, zero-contamination, acetate liner was used to take the samples. At each sampling time, eight individual soil

cores (1 inch diameter) were collected at random from each treated plot. The cores were sectioned into 6" depth increments, and the 8 soil samples from each depth increment were composited to form one sample for each of the 3 plots.

The samples were frozen after collection, then shipped to the laboratory for analysis. At the analytical laboratory each sample was homogeneously mixed and refrozen until analysis. Samples were stored frozen for approimately 3½ years.

Throughout the experimental period, daily measurements were made of air temperature, soil temperature, and precipitation (see Apendices I, J, K, and L). Detailed weather data is shown in Appendices M, N, O, and P for comparison with rate of degradation and leaching data.

XRD-498 residues were extracted from soil using a 90% acetone/10% 0.1N hydrochloric acid. Following evaporation of the acetone this sample was diluted with 0.005N HCl and purified using solid-phase extraction (SPE). The eluent was evaporated to dryness, and the residue reconstituted with acetonitrile. The derivatized sample solution was evaporated to dryness, reconstituted with toluene containing N-d_3-methyl XRD-498 as an internal standard and analyzed by GC/Mass Spectrometry.

A computer program, SigmaPlot 4.0, was used to calculate first order half-lives.

DATA SUMMARY:

The actual application rates of XRD-498 were 57, 67, 71, and 115 ppb at Geneseo (Table VIII). The high organic carbon at Geneseo would have lowered the soil density beneath the average 1.35 g/cm^3 and this raised the ppb level. Therefore, the initial concentration found were consistent with those expected.

The half-lives were roughly consistent with previous laboratory results, provided that the effects of moisture content are considered. The amount of XRD-498 remaining after the first year was reported to be near the 2.5 ppb detection limit. The highest reported was Geneseo, MS which was reported to be ≈8 ppb. After a year and a half, all XRD-498 levels were reported to be roughly 2 ppb or lower.

Vertical movement apparently did occur in two of the four locations. These locations (Burdette, MS and Midland, MI) were on soils that were considered well drained. The two location which did not indicate vertical movement (Wayside, MS and Geneseo, IL) were considered to have moderate to poor drainage ability. In addition, the Geneseo site was reported to have a high organic carbon content. These results indicate that XRD-498 may move vertically in soils that are well drained and have low organic matter content.

The results of each site is discussed separately. The half-lives and soil mobility data are covered in Tables III through VI.

Midland, MI

The reported half-life for XRD-498 when applied to sandy clay loam soil was 1.5 months. This is longer than the laboratory half-life of two weeks. The authors attributed soil moisture for the difference. The leaching was spotty in the field (only one sample in the 14 day set contained XRD-498 below 0-6"). All three of the 28 day samples showed XRD-498 in the 6-12" and 12-18" depths, but none of the day 39 samples showed any XRD-498 below

0-6" depth. Samples on 119, 288, and 534 days also showed no XRD-498 at depths below 0-6".

Geneseo, IL

The reported initial half-life for XRD-498 when applied to silty clay loam soil was <1 week. Degradation then slowed for the remainder of the test period. The soil moisture content showed a constant, favorable supply of soil water. Therefore, the author concluded that the high content of organic matter of the soil absorb XRD-498 which reduced its availability to soil microorganisms. The authors interpreted this as a gradual sorption of natural organic compounds over the already-sorbed pesticide, thus preventing desorption of the pesticide. If the low values at 14 and 28 days posttreatment, which could have resulted from sampling problems, were omitted from the rest of the degradation curve a half-life of 3 months was calculated. This is consistent with reported data for soils with high content of organic matter. XRD-498 was not detected below the 0-12" depth. Two of the 6-12" depth samples contained XRD-498 in the reported results.

Wayside, MS

The reported half-life for XRD-498 on silt loam soil was 3 months. Based on the soil moisture content and the data obtained, the authors believe that under favorable moisture conditions a one month half-life would be expected; under dryer conditions, a longer half-life is possible.

The authors believed XRD-498 did not leach at Wayside. Residues were found in one of the day 41, day 79, and day 120 posttreatment at the 6-12" depth sample. No residues were ever found in the 12-18" and the 18-24" depth samples. There were two heavy rainfalls during the testing period.

Burdette, MS

The reported half-life for XRD-498 when applied to silt loam soil was 1.5 months. This calculated half-life incorporated residue data for all depths in the soil profile, so that loss of XRD-498 due to leaching would not be confused with loss from microbial degradation. Sample interval at the beginning of the following season, day 370, there was still 8 ppb found. However, day 449 and day 563 sample interval indicated there was continual degradation of the XRD-498.

The data indicated there was vertical movement of XRD-498. XRD-498 was detected in the 6-12" depth samples at day 3 and 7. In addition, XRD-498 was detected in the day 14 samples at 12-18" depth. There was no detection of XRD-498 below 6" in the day 40 samples. However, there was detection in a day 80 sample at 3-4 foot depth. Although soil sampling at early times was not sufficient to determine the depth of leaching, the detection at 3-4 foot in the 80 day sample suggests that leaching did occur.

COMMENTS:

1. The data was reported as XRD-498. The presents of degradate(s) were not addressed. Therefore, the pattern of decline and formation of parent and degradate(s) was not addressed.

2. Based on the pattern of decline and formation of parent and degradate (s) not being addressed, the sampling intervals may not be sufficient to determine these patterns.

3. The guidelines require two different bare ground representative sites be tested to fulfill the data requirements. Four sites were tested and

reported in this study, two from the relative southern warmer climates and two from further north cooler climates.

4. In the Genesco, IL portion of this study, two half-lives were calculated. The second half-life was calculated by omitting the day 14 and day 28 data. The authors felt the variability in the data was due to the high organic content of the soil since there was sufficient soil moisture present. XRD-498 can become strongly bound to organic matter in soil over a period of time, and was interpreted as gradual sorption of natural organic compounds over the already-sorbed pesticide, this prevent desorption of the pesticide. The three month half-life is consistent with half-lives determined in the laboratory for soils with high content of organic matter.

5. Samples were stored for ≈3½ years. Previous storage stability data indicated that ≈3% average loss of XRD-498 occurred over a two year period. No specific storage stability data was furnished beyond the 2 year period.

RIN # 4644-93 EFGW Review & Residue Chemistry Review for Flumetsulam (129016)

Page_____ is not included in this copy.

Pages 6 through 66 are not included.

The material not included contains the following type of information:

____ Identity of product inert ingredients.

____ Identity of product impurities.

____ Description of the product manufacturing process.

____ Description of quality control procedures.

____ Identity of the source of product ingredients.

____ Sales or other commercial/financial information.

____ A draft product label.

____ The product confidential statement of formula.

____/ Information about a pending registration action.

____ FIFRA registration data.

____ The document is a duplicate of page(s) _____.

____ The document is not responsive to the request.

The information not included is generally considered confidential by product registrants. If you have any questions, please contact the individual who prepared the response to your request.