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DATA EVALUATION RECORD

STUDY IDENTIFICATION:

Valadez, S.K., and B.A. Dehart. 1994. Terrestrial Field Dissipation of Phostebupirim (MAT 7484) on Minnesota Soil. Study performed by Agri-Growth Research, Inc., Hollandale, Minnesota and Miles Environmental Fate Analytical, Kansas City, Missouri and submitted by Miles Inc., Kansas City, Missouri. MRID No. 430927-03.

TYPE OF STUDY: Terrestrial Field Dissipation (64-1)

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CONCLUSIONS:

1. This study by itself is supplemental and provides no information as to the dissipation of MAT 7484 under field conditions.
2. The half-life of MAT 7484 was reported to be 14.4 days in this banded application Minnesota corn field dissipation study. However, in view of the laboratory data indicating that the most rapid dissipation route was by hydrolysis (45 days at pH 7.0, which was the pH of the soil in this study), and that no MAT 7484 residues were detected below the 6-12 inch soil horizon, an explanation for the dissipation route for MAT 7484 is necessary.

MATERIALS AND METHODS:

Phostebupirim (Aztec 2.1% granular, 2.1% active ingredient) was applied at the time of corn planting in a 7-inch band at a rate of 0.168 lb a.i./A to a sandy loam soil plot (see Table 3 for soil characteristics) located near Hollandale, Minnesota on August 1, 1991. The slope of the test plot (75 ft x 120 ft) was <1% and the water table was more than 6 feet below the soil surface. A buffer zone of 5 to 7.5 ft was established on all sides of the plot. A total of 15.7 g ai of phostebupoirim (2.04% phostebupirim and 0.1% cyfluthrin) was applied to 9000 ft² with a Nobel applicator attached to the corn planter. The compound was applied in a 7-inch band. The theoretical concentration in the treated band was 0.73 lb ai/A and the row

spacing was 30 inches. During the course of the study a total of 47.90 inches of precipitation (natural and irrigation) occurred which represented 146% of the ten year monthly average.

The plot was divided into 5 equal sections (designated A through E) and each section was further divided into 72 subsections (5 ft x 5 ft) resulting in a total of 360 subsections. At each sampling interval (see Table 4) three randomly selected subsections were sampled from each section of the plot. Only one acceptable (37 inches or greater in length) soil core was taken from a subsection during the study. Soil cores were taken to a depth of 6 inches immediately after application and to a minimum depth of 37 inches at all other sampling intervals (Day 1, 2, 4, 8, 10, 14, 21, 28, 61, 91, 104, 252, 306, 344, 365 posttreatment). Soil cores were taken with a sampling probe with an inside diameter of $2\frac{3}{8}$ inches on the day of application and with a probe having an inside diameter of $1\frac{3}{4}$ inches for all other intervals. The probe was fitted with a clean plastic liner prior to taking each sample. After each sample, the liner containing the soil core was removed, deepest end first. Each core hole was filled with untreated soil from an adjacent area. In the field immediately after soil cores were retrieved and labeled, they were placed in a cooler box filled with ice. Upon arrival at the field research facility, the cores were removed and placed in frozen storage and later transported frozen to the processing laboratory at Miles Research Park. At the processing laboratory the soil cores were segmented, composited, and assigned new identification numbers. To provide additional storage stability data, 50 g aliquots of untreated soil from near the test plot were fortified separately with phostebupirim and OMAT standards at each sampling interval. One sample was left untreated at each interval to serve as a control. The field fortified samples were stored and transported with the soil cores.

The 15 core samples per sampling interval were segmented and composited by depth (0-6 inch, 6-12 inch, 12-18 inch, 18-24 inch, 24-30 inch, 30-36 inch, and 36 inch to end of core) resulting in three composite samples per depth, each composed of one core from each section of the plot. Each sample was thawed, sieved through a 2-mm sieve, and a 25-g aliquot placed into a 25 mm i.d. x 80-mm Whatman cellulose thimble. Glass wool was added to the thimble and placed in a Soxhlet extractor and extracted with chloroform/methanol (7:3). The chloroform/methanol solution was evaporated and 50 ml hexane was added to the flask and transferred through anhydrous sodium sulfate. This step was repeated two more times. The solution was concentrated to dryness and then 2.5 ml of methanol was added. The solution was then filtered through a 0.45 μ filter. A 5- μ l aliquot was analyzed by gas chromatography.

Residues of phostebupirim in soil samples were determined from a standard curve prepared before each analytical run. The least square curve fitting method was used to generate the best

line used to calculate the corresponding concentration for the peak of the actual sample. Although no phostebupirim metabolite exceeded 10% of the total applied radioactivity in the laboratory soil metabolism studies, in this study analyses were made for parent phostebupirim and the metabolites OMAT and IMATS. The lowest level of fortification in the method validation was 0.01 ug/g and this was set as the limit of detection.

REPORTED RESULTS:

1. The reported half-life of MAT 7484 in this Minnesota field study was 14.4 days.
2. Most residues were reportedly found in the 0-6 inch soil horizon and only on day 2 posttreatment were any residues reported as far as the 6-12 inch soil horizon. OMAT was detected in the 0-6 inch soil horizon at 91 days postapplication. There were no reported residues of IMATS in any of the test intervals.

DISCUSSION:

1. In this study the overall application rate was 0.168 lb ai/A and the compound was applied in a 7-inch band which increased the theoretical concentration in the band area to 0.73 lb ai/A. The plot was divided into 5 equal sections which were further divided into 72 subsections (5 ft x 5 ft) for a total of 360 subsections. At each sampling interval three randomly subsections were sampled from each section of the plot and during the course of the study only one core was taken from a subsection. No mention was made as to which cores were taken from the banded areas and which from areas between the bands. Statistically there would be a greater chance of the cores being taken from areas between the bands than from banded areas. The cores were segmented and composited into 3 samples per depth (each composed of one core from each section). Without the knowledge of cores taken from the 7-inch bands it can only be assumed by random selection that the residues reported were diluted out by the sampling techniques employed. Thus by dilution it may be that the half-life reported in this study is much shorter than the fastest laboratory reported dissipation route (45 days by hydrolysis at pH 7.0, MRID No. 42005465). It is to be noted that the aerobic soil metabolism half-life was reported as 343 days (application rate was >30x maximum field application rate) and the anaerobic soil half-life was 279 days (MRID No. 42005468). No mention was made in this study as to what the proposed route of dissipation was contributing to the short reported half-life. It should be noted that the average concentration of MAT 7484 in the 0-6 inch soil segment was 0.37 ug/g (0.37 ppm) at day 0, and at day 1 it was 0.17 and at day 10 it was 0.18 ppm, indicating that sampling dilution may have caused low recovery of the residues.

2. It is noted that in Figure 11 the positions on the chromatograms for parent and metabolite in the 10 ppb spike are

different in retention times than those shown for the 17.5 ppb, 20 ppb, and 50 ppb spikes in Fig 12 and the retention times shown in Figs. 6 and 7.

3. The detection limits in this study were 0.01 ppm. If one were to use the average application rate of 0.168 lb ai/A then this detection limit is less than 10% of the applied at time of application in the 0-6 inch soil segment. Only by sampling in the 7-inch application area band could there be detections at any other sampling depth.

4. The reviewer calculated half-life using the information provided in Tables 11-22 indicated that the true half-life was 55 days with an r^2 of 0.296. However, the dissipation is not very linear and no pattern of dissipation can be established.

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