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SHAUGHNESSY NO

REVIEW NO.

EEB REVIEW

DATE IN: 7-30-90 OUT: MAR 26 1992
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MRID #(S) _____

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DP TYPE 001

PRODUCT MANAGER, NO. ROBERT TAYLOR

PRODUCT NAME(S) ARSENAL

TYPE PRODUCT HERBICIDE

COMPANY NAME AMERICAN CYANAMID

SUBMISSION PURPOSE REVIEW SPRAY DRIFT DATA FOR RISK ASSESS AND CONSIDER REQUEST TO WAIVE PLANT TIER III TESTING

COMMON CHEMICAL NAME IMAZAPYR

REVIEWER: CHARLES LEWIS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MEMORANDUM

MAR 26 1992

OFFICE OF
PESTICIDES AND TOXIC
SUBSTANCES

SUBJECT: Registrant Request to Waive Tier III Terrestrial Plant Growth Test Requirement for Arsenal Herbicide Concentrate (isopropylamine salt of imazapyr). DP BARCODE D153348

FROM: Douglas J. Urban, Acting Chief
Ecological Effects Branch
Environmental Fate and Effects Division (H7507C) 3/25/92

TO: Robert J. Taylor, PM 25
Herbicide/Fungicide Branch
Registration Division (H7505C)

The Ecological Effects Branch (EEB) has received a request by American Cyanamid Company to waive the Tier III terrestrial plant growth test for Arsenal Herbicide Applicators Concentrate. This test was required for aerial use in an EEB review dated December 27, 1989 based on the results of Tier II testing. To support the request for a waiver, American Cyanamid has provided the following three reports on drift:

Fears, R. D. and S. A. McMaster. 1986. Proceedings, Southern Weed Science Society, 39th Annual Meeting, pp. 354-363.

Pesticide Science 1980 (1981) UK Ministry of Agriculture, Fisheries and Food, Agriculture Science Service Reference Book 252 (80), pp. 39-40.

Stewart, R. E. and H. Gratkowski. 1976. USDA Forest Service Technical Report, No. PNW-54, pp. 7-10.

During the review of this waiver request, EEB has determined that because of the similarity of several imazapyr products, errors were made in previous reviews concerning nontarget plant data requirements. Consequently, this response will encompass both imazapyr acid (chemical code 128821, AC 243,997; Arsenal Herbicide 0.5 Granule - EPA Reg. No. 241-295 and Arsenal Herbicide Forestry Granule - EPA Reg. No. 241-308) and the isopropylamine salt of imazapyr (chemical code 128829, AC 252,925; Arsenal Herbicide - EPA Reg. No. 241-273, Arsenal Herbicide Applicators Concentrate - EPA Reg. No. 241-299).

IMAZAPYR ACID

The following is a summary of the plant data available in EEB files for imazapyr acid (chemical code 128821, AC 243,997):

American Cyanamide Company. 1988. The Effect of Arsenal (AC 243,997) on Non-Target Terrestrial Plants. Tier II Seed Germination. Conducted and submitted by American Cyanamid Company, Agricultural Research Division, P.O. Box 400, Princeton, N.J. 08540. Accession No. 408118-01

The study was originally found to be scientifically sound and fulfilled the guideline requirement for a Tier II seedling emergence test using terrestrial species when reviewed on November 29, 1988. Upon reviewing the data evaluation record (DER), it has been noted that only EC50's are reported, no EC25's, and insufficient information is contained in the DER to determine if further testing is required. However, EEB has concluded that further testing will not be required since a valid seedling emergence test is available. The seedling emergence test will be used in the hazard assessment for imazapyr acid.

American Cyanamide Company. 1988. The Effect of Arsenal (AC 243,997) on Non-Target Terrestrial Plants. Tier II Seedling Emergence and Vegetative Vigor. Conducted and submitted by American Cyanamid Company, Agricultural Research Division, P.O. Box 400, Princeton, N.J. 08540. Accession No. 408118-01

The study is scientifically sound and fulfills the guideline requirement for a Tier II seedling emergence test and vegetative vigor test using terrestrial species. Seedling emergence EC25 values were as follows: corn - 2.3 g/ha (plant height), wheat - 2.2 g/ha (plant injury), sugarbeet - 2.2 g/ha (percent emergence), sunflower - 2.7 g/ha (plant height), tomato - 140 g/ha (plant injury), cucumber - 4.4 g/ha (plant injury), oat - 4.1 g/ha (plant height), onion - 7.8 g/ha (plant height), soybean - 14.3 g/ha (plant height), and pea - 17.5 g/ha (plant injury). Using plant height as the test parameter, vegetative vigor EC25 values ranged from 2.0 to 36.0 gms/ha. Sugarbeet was the most sensitive test species.

Hughes, J.S. 1987, The Toxicity of AC 243,997 to Skeletonema costatum. Prepared by Malcolm Pirnie, Inc., White Plains, NY. Submitted by American Cyanamid Company, Princeton, NJ. Accession No. 408118-02.

The study is scientifically sound and fulfills the guideline requirement for a Tier II growth and reproduction study using a marine diatom. With a 7-day EC50 of 92 mg/L and a NOEC of 15.9 mg/L mean measured concentration, AC 243,997 is not expected to exert a detrimental effect on Skeletonema costatum when applied at a maximum application rate of 1.5 lb ae/A (direct application to 6 inch water column equals 1.1 mg/L).

Hughes, J.S. 1987, The Toxicity of AC 243,997 to Selenastrum capricornutum. Prepared by Malcolm Pirnie, Inc., White Plains, NY. Submitted by American Cyanamid Company, Princeton, NJ. Accession No. 408118-02.

The study is scientifically sound and fulfills the guideline requirement for a Tier II growth and reproduction study using a freshwater green algae. With a 7-day EC50 of 71 mg/L and a NOEC of 50.9 mg/L mean measured concentration, AC 243,997 is not expected to exert a detrimental effect on Selenastrum capricornutum when applied at a maximum application rate of 1.5 lb ae/A (direct application to 6 inch water column equals 1.1 mg/L).

Hughes, J.S. 1987, The Toxicity of AC 243,997 to Navicula pelliculosa. Prepared by Malcolm Pirnie, Inc., White Plains, NY. Submitted by American Cyanamid Company, Princeton, NJ. Accession No. 408118-02.

The study is scientifically sound and fulfills the guideline requirement for a Tier II growth and reproduction study using a freshwater diatom. With a 7-day EC50 of >41 mg/L and a NOEC of 41 mg/L mean measured concentration, AC 243,997 is not expected to exert a detrimental effect on Navicula pelliculosa when applied at a maximum application rate of 1.5 lb ae/A (direct application to 6 inch water column equals 1.1 mg/L).

Hughes, J.S. 1987, The Toxicity of AC 243,997 to Lemna gibba. Prepared by Malcolm Pirnie, Inc., White Plains, NY. Submitted by American Cyanamid Company, Princeton, NJ. Accession No. 408118-02.

The study is scientifically sound and fulfills the guideline requirement for a Tier II growth and reproduction study using an aquatic macrophyte. With a 14-day EC50 of 0.024 mg/L and a NOEC of 0.01 mg/L mean measured concentration, AC 243,997 is expected to exert a detrimental effect on Lemna gibba when applied at a maximum application rate of 1.5 lb ae/A (direct application to 6 inch water column equals 1.1 mg/L).

Hughes, J.S. 1987, The Toxicity of AC 243,997 to Anabaena flos-aquae. Prepared by Malcolm Pirnie, Inc., White Plains, NY. Submitted by American Cyanamid Company, Princeton, NJ. Accession No. 408118-02.

The study is scientifically sound and fulfills the guideline requirement for a Tier II growth and reproduction study using a blue green algae. With a 7-day EC50 of 12.2 mg/L and a NOEC of 9.6 mg/L mean measured concentration, AC 243,997 is not expected to exert a detrimental effect on Anabaena flos-aquae when applied at a maximum application rate of 1.5 lb ae/A (direct application to 6 inch water column equals 1.1 mg/L).

Arsenal Herbicide 0.5 Granule - EPA Reg. No. 241-295 is currently registered for weed control in noncrop areas at a maximum rate of 1.0 lb ae/A and Arsenal Herbicide Forestry Granule - EPA Reg. No. 241-308 is registered for site preparation and conifer release at a maximum rate of 1.5 lb ae/A. For imazapyr acid, EEB is concerned with nontarget aquatic plant damage during aerial application and nontarget terrestrial and aquatic plant damage from runoff following ground or aerial application. Since this material is only available in a granular form, the hazard to terrestrial and aquatic plants from drift during application is consider minimal.

Aquatic plants - runoff

Using the EEB scenario of 10 acres being treated at 1.5 lbs ae/A with 5% runoff, 0.75 lb ae could be lost from the field. This loading could result in a water concentration of 551.25 ppb in a 1 acre pond 6 inches deep. Concentrations in 6 feet of water could be 45.75 ppb.[1/] Aquatic nontarget plant EC50 values were 71 ppm - Selenastrum capricornutum, 24 ppb - Lemna gibba, 92 ppm - Skeletonema costatum, 12.2 ppm - Anabaena flos-aquae, and >41 ppm - Navicula pelliculosa. Based on this scenario and data currently available, aquatic nontarget plants (Lemna gibba) could be expected to be adversely affected following ground applications of granular imazapyr for site preparation or conifer release. Aquatic plant testing at the Tier III level is required.

1/ 10 acres x 1.5 lb ae/A x 5% runoff = 0.75 lb ae; 0.75 lb ae x 735 ppb = 551.25 ppb; 0.75 lb ae x 61 ppb = 45.75 ppb.

At the 1.0 lb ae/A rate for noncrop areas, runoff could result in a water concentration of 367.5 ppb in 6 inches of water and 30.5 ppb in 6 feet of water.[1/] Based on this scenario and data currently available, aquatic nontarget plants (Lemna gibba) could be expected to be adversely

affected following ground applications of granular imazapyr for weed control in noncrop areas. Aquatic plant testing at the Tier III level is required.

2/ 10 acres x 1.0 lb ae/A x 5% runoff = 0.5 lb ae; 0.5 lb ae x 735 ppb = 367.5 ppb; 0.5 lb ae x 61 ppb = 30.5 ppb.

Aquatic plants - direct exposure

Assuming an inadvertent direct application to a stream 6 inches deep at the 1.5 lb ae/A rate during site preparation or conifer release, the water concentration could be 1.1 ppm.[3/] Based on this scenario and data currently available, aquatic nontarget plants (Lemna gibba) could be adversely affected following applications of granular imazapyr. Aquatic plant testing at the Tier III level is required.

3/ 1.5 lb ae/A x 735 ppb = 1.1 ppm

At the 1.0 lb ae/A rate, the water concentration in the stream could be 0.74 ppm.[4/] Aquatic nontarget plants could be adversely affected. Testing at the Tier III level is required.

4/ 1.0 lb ae/A x 735 ppb = 0.74 ppm

Terrestrial plants - runoff

Using the EEB scenario of 1 acre treated at 1.5 lbs ae/A with 5% runoff, 0.075 lb ae could be lost from the field and be deposited on an adjacent acre. This would be the equivalent of 84 gms ae/h.[5/] Lowest EC25 values for seedling emergence were 2.2 gms/h. Consequently, terrestrial nontarget plants could be adversely affected from runoff. Terrestrial plant testing at the Tier III level is required for the forestry use.

5/ 1.5 lb ae/A x 1 acre x 5% runoff = 0.075 lb ae; 0.075 lb ae/A x 1120.85 conversion factor = 84 gms ae/h

At the 1.0 lb ae/A rate with 5% runoff, 0.05 lb ae could be lost from the field and be deposited on an adjacent acre. This would be the equivalent of 56 gms ae/h.[6/] Lowest EC25 values for seedling emergence were 2.2 gms/h. Consequently, terrestrial nontarget plants could be adversely affected from runoff. Terrestrial plant testing at the Tier III level is required for the noncrop use.

6/ 1.0 lb ae/A x 1 acre x 5% runoff = 0.05 lb ae/A; 0.05 lb ae/A x 1120.85 conversion factor = 56 gms ae/h

ISOPROPYLAMINE SALT of IMAZAPYR

The following is a summary of the plant data available in EEB files for the isopropylamine salt of imazapyr (chemical code 128829, AC 252,925):

The Effect of Arsenal on Seed Germination, Seedling Emergence, and Vegetative Vigor. Report No. DIS-P Vol. 6-15, August 4, 1986, American Cyanamid Company. Submitted by American Cyanamid Company under Accession Nos. 40003710 and 40003711.

The study appears to be scientifically sound but does not fulfill the guideline requirement for a Tier II terrestrial nontarget plant test. Results of the tests were provided in summary form and raw data were not available to determine 25 and 50 percent effect levels. In addition, number of seeds per replicate, percentage seed germination, and identification of cultivars tested were not included. Even though the study was conducted on an end-use product rather than the technical grade active ingredient, submission of missing information may result in this study satisfying the data requirement for seed germination and seedling emergence. The vegetative vigor portion of the study is not repairable and must be repeated.

The Effect of Arsenal Herbicide on Aquatic Plant Growth. American Cyanamide Company, Agricultural Division. Submitted by American Cyanamid Company under Accession Nos. 40003710 and 40003711.

The study appears to be scientifically sound but does not satisfy the guideline requirement for a Tier II aquatic plant study. The required species were not tested and the information provided is in summary form. Testing was also conducted using a formulated product. Data indicate that AC 252,925 (53.1 % ai) at concentrations equal to 0.5 lb ai/A resulted in a 50% or greater population reduction in Azolla spp., Pistia stratiotes, and Elodea canadensis.

Arsenal Herbicide - EPA Reg. No. 241-273 is currently registered on noncrop areas at a maximum rate of 1.5 lb ae/A and Arsenal Herbicide Applicators Concentrate - EPA Reg. No. 241-299 is registered for site preparation, conifer release and control of undesirable vegetation along forest roads, non-irrigation ditchbanks, and the establishment and maintenance of wildlife openings at a maximum rate of 1.25 lb ae/A. For the isopropylamine salt of imazapyr, EEB is concerned with nontarget plant damage from runoff following ground and aerial application and nontarget plant damage from drift during aerial application.

7

Aquatic plants - terrestrial runoff plus drift

Using the EEB scenario of 10 acres treated at 1.5 lbs ae/A with 5% runoff, 0.45 lb ae could be lost from the field. Add to this 5% drift and total loading could be 0.525 lb ae. This loading could result in a water concentration of 385.88 ppb in a 1 acre pond 6 inches deep [7/]. EC50 values are not available on the isopropylamine salt for the required aquatic plants. Consequently, no conclusions can be reached on the effect of this herbicide on aquatic nontarget plants.

7/ 1.5 lbs ae x 0.6 efficiency x 5% runoff x 10 acres = 0.45 lb ae; 1.5 lbs ae x 5% drift = 0.075 lb ae; 0.45 lb ae + 0.075 lb ae = 0.525 lb ae; 735 ppb x 0.525 = 385.88 ppb

At the 1.25 lb ae/A rate on a 10 acre field, total loading could be 0.4375 lb ae or a water concentration of 321.56 ppb in 6 inches.[8/] No conclusions can be reached on the effect of this herbicide at this rate on aquatic nontarget plants.

8/ 1.25 lb ae/A x 0.6 efficiency x 5% runoff x 10 acres = 0.375 lb ae; 1.25 lb ae x 5% drift = 0.0625 lb ae; 0.375 lb ae + 0.0625 lb ae = 0.4375 lb ae; 735 ppb x 0.4375 lb ae = 321.56 ppb

Terrestrial plants - drift

EEB is currently using 5% drift to calculate off target plant damage following aerial herbicide applications. At an application rate of 1.5 lbs ae/A, this could result in 0.075 lb ae being deposited on an adjacent 1 acre [9/]. However, no acceptable vegetative vigor data are available for the isopropylamine salt. No conclusions can be reached on the effect of this herbicide on terrestrial nontarget plants.

9/ 1.5 lbs ae x 5% drift = 0.075 lb ae

At the 1.25 lb ae rate with 5% drift, 0.0625 lb ae could be deposited on an adjacent 1 acre.[10/] No conclusions can be reached on the effect of this herbicide at this rate on terrestrial nontarget plants.

10/ 1.25 lb ae x 5% drift = 0.0625 lb ae

Terrestrial plants - runoff

Using the EEB scenario of 1 acre treated at 1.5 lbs ae/A with 5% runoff, 0.075 lb ae could be lost from the field

and be deposited on an adjacent acre. This would be the equivalent of 84 gms ae/h.[5/] However, no acceptable seedling emergence data are available for the isopropylamine salt. No conclusions can be reached on the effect of this herbicide on terrestrial nontarget plants.

At the 1.25 lb ae/A rate, 0.0625 lb ae could be lost from the field and deposited on an adjacent acre. This would be equivalent to 70.1 gms ae/h.[11/] No conclusions can be reached on the effect of this herbicide at this rate on terrestrial nontarget plants.

11/ 1.25 lb ae/A x 1 acre x 5% runoff = 0.0625 lb ae; 0.0625 lb ae x 1120.85 conversion factor = 70.1 gms ae/h

Conclusions

EEB is requesting that the Registration Division (RD) transmit copies of the three drift studies submitted by American Cyanamid Company to the Environmental Fate and Ground Water Branch (EFGWB) for evaluation. Upon receipt of the EFGWB reviews, EEB will utilize this information along with required nontarget plant data to complete the hazard assessment for the isopropylamine salt of imazapyr.

Tier II nontarget plant data required for the isopropylamine salt of imazapyr include: Tier II, 123-1 vegetative vigor and seedling emergence testing and Tier II, 123-2 aquatic nontarget plant growth testing using Selenastrum capricornutum, Lemna gibba, Skeletonema costatum, Anabaena flos-aquae, and a freshwater diatom. Following review of these data, EEB will determine whether Tier III nontarget plant testing will be required for the isopropylamine salt of imazapyr.

For the imazapyr acid, all required Tier II nontarget plant data have been reviewed. Based on these data, nontarget terrestrial and aquatic plants could be adversely affected from the use of imazapyr acid. EEB is currently in the processes of developing guidance for Tier III testing. Pending completion of this effort, Tier III data requirements should be postponed. The waiver is not granted.

If you have questions regarding this review please contact Charles Lewis at 305-7463.