103601
SHAUGHNESSEY NO.

65
REVIEW NO.

# EEB BRANCH REVIEW

DATE: IN 9-22-83 OUT 10/24/83

FILE OR REG. NO. 524-343

PETITION OR EXP. PERMIT NO.

DATE OF SUBMISSION 8-29-83

DATE RECEIVED BY HED 9-20-83

RD REQUESTED COMPLETION DATE 12-1-83

EEB ESTIMATED COMPLETION DATE 11-24-83

RD ACTION CODE/TYPE OF REVIEW 335/Amendment

TYPE PRODUCT(S): I, D, H, F, N, R, S Herbicide

DATA ACCESSION NO(S).

PRODUCT MANAGER NO. R. Taylor (25)

PRODUCT NAME(S) Rodeo

COMPANY NAME Monsanto Company

SUBMISSION PURPOSE Proposed conditional registration of tidewater areas and flooded river levees

| SHAUGHNESSEY NO. | CHEMICAL, & FORMULATION | % A.I. |
|---|---|---|
| 103601 | Isopropylamine salt of glyphosate | 53.5% |

Glyphosate

100 Pesticide Label Information

100.1 Pesticide Use

Tidewater areas and flooded rivers levees

100.2 Formulation Information

Active Ingredient:

| | |
|---|---|
| *Isopropylamine salt of glyphosate..... | 53.5% |
| Inert Ingredient..... | 46.5% |
| | 100.0% |

Contains 648 grams per litre or 5.4 pounds of the active ingredient isopropylamine salt of N-(phosphonomethyl) glycine per U.S. gallon Equivalent to 480 grams per litre or 4 pounds per U.S. Gallon of the acid glyphosate.

100.3 Application Methods, Directions, Rates

From label of Rodeo EPA Reg. No. 524-343

Directions For Use
Aquatic Sites

When applied as directed under conditions described this product plus nonionic surfactant will control or partially control emerged annual and perennial weeds and woody brush and trees listed in this label. This product does not control plants which are either completely submerged or have a majority of the foliage under water. See the "Weeds Controlled" section of this label for rates and degree of control provided.

This product may be used in and around aquatic sites including all bodies of fresh and brackish water, which may be flowing, non-flowing, or transient. This includes lakes, rivers, streams, ponds, seeps, irrigation and drainage ditches, canals, reservoirs, and similar sites. There is no restriction on the use of water for irrigation, recreation or domestic purposes.

For treatments after drawdown of water or in dry ditches, allow 7 or more days after treatment before reintroduction of water. Apply the product within one day after drawdown to ensure application to actively growing weeds.

When using this product in aquatic sites where water is present, add 1 to 2 quarts of Ortho X-77 surfactant per 100 gallons of spray solution (1/4 to 1/2% surfactant by total spray volume).

When using this product in sites where water is not present (dry ditches, ditch bank, dry canals), use 1 to 2 quarts of nonionic surfactant per 100 gallons of spray solution (1/4 to 1/2% surfactant by total spray volume).

Consult local state fish and game agency and water control authorities before applying this product to public water. Permits may be required to treat such water.

Note: Do not apply this product within 0.5 miles up stream of potable water in takes.

Floating mats of vegetations may require retreatment. Avoid washoff of sprayed foliage by spray boat or recreational boat backwash or by rainfall within six hours of application. Do not retreat within 24 hours following the initial treatment.

Applications made to moving bodies of water must be made while traveling upstream to prevent concentration in water. When making bankside applications, do not overlap more than 1 foot into open water. The maximum application rate of 7 1/2 pints per acre must not be exceeded in any single application. Do not spray across open moving bodies of water.

When emerged infestations require treatment of the total surface of impounded water, treating the area in strips may avoid oxygen depletion due to decaying vegetation. Oxygen depletion may result in fish kill.

(The complete label has been attached to this review if any further information is required.)

100.4 Target Organisms

See the attached label for target plants and specific methods of application.

100.5 Precautionary Labeling

Environmental Hazards

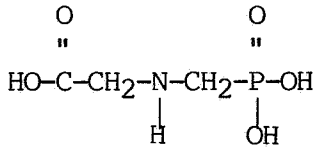
Do not contaminate water by disposal of waste or cleaning of equipment. In case of SPILL or LEAK soak up and remove to a landfill.

101 Physical and Chemical Properties

101.1 Chemical Name

Isopropylamine salt of N-(phosphono-methyl) glycine

101.2 Structural Formula



101.3 Common Name

Glyphosate

101.4 Trade Name

Rodeo

101.5 Molecular Weight (active ingredient)

169.09

101.6 Physical State:

White crystalline solid

101.7 Solubility

Water 1% @ 25 C, (M.P. = 200 C)
Ethanol = insoluble
Acetone = "
Benzene = "

102 Behavior in the Environment

103 Toxicological Properties

103.2 Minimum Requirements

103.2.1 Avian Acute Oral $LD_{50}$ -

103.2.2 Avian Dietary $LC_{50}$

(See Bascietto 6/14/83, #64 review)

103.2.3 Fish Acute $LC_{50}$

(See Bascietto 6/14/83, #64 review)

In addition to the studies reported in the above review the $LC_{50}$s for the glyphosate with X-77 surfactant are available.

| Species | LC50 (C.L.) mg/l | Validation |
|---|---|---|
| Rainbow Trout 96-hr | 240 (180 - 320 mg/l) | Supplemental |
| Bluegill Sunfish 96-hr | 830 (602-1600 mg/l) | " |

103.2.3 Aquatic Invertebrates $LC_{50}$ (See Bascietto 6/14/83, #64 review)

In addition to the studies reported in the above review the $LC_{50}$s for the glyphosate with X-77 surfactant are available.

| Species | LC50 (C.L.) mg/l | Validation |
|---|---|---|
| Daphnia magna | >1000 mg/l | Supplemental |

103.3 Additional Terrestrial Laboratory Tests

(See Bascietto 6-14-83, #64 review)

104 Hazard Assessment

104.1 Discussion

Previous reviews of glyphosate products have indicated a concern for toxicity to aquatic organisms of the surfactant identified by the Monsanto as MONO818. No other wildlife appears to sensitive enough to indicate a hazard. Rodeo calls for X-77 and/or other nonionic surfactants to be added at the mixing location and is not apart of the Rodeo formulation.

104.2 Likelihood of Adverse Effects to Non-Target Organisms.

As mentioned in previous reviews glyphosate is practically non-toxic to aquatic organisms. Hence by itself it would not be expected to present a hazard. In the case of X-77 surfactant the same is true. In fact aquatic organisms can tolerate nearly 10 times more X-77 surfactant and glyphosate than glyphosate alone. Based on this minimal hazard is expected to aquatic organisms. Based on previous reviews minimal hazard is expected to terrestrial fauna.

Ortho X-77 is only required for the aquatic sites where water is present. In sites where water is not present (dry ditches, ditchbanks, dry canals) 1 to 2 quarts of nonionic surfactant per 100 gallons of spray solution can be used. This may result in a hazard to aquatic organisms. Macek and Krzeminski (1975, see appendix) 17 nonionic surfactants 96 hour $LC_{50}$ for Bluegill vary from 1.3 mg/l to >1000 mg/l. The lowest value of this range could be a hazard to aquatic organisms. Hence, the following calculations were used to determine the application rate for the surfactant.

Assumptions

1. 7.5 pts/A = product application rate

2. 1.5 pts/A = 1.5% solution of active ingredient

3. 5.4 lbs/gal = lbs of active ingredient

4. 0.5% solution for dry aquatic sites of surfactant

1. $\frac{5.4 \text{ lbs}}{8 \text{ pts}}$ = .675 lbs/pt = Pounds of product per pint

2. 0.675 lbs x 7.5 pts/A = 5 lbs/A = Pounds of product per acre

3. $\frac{X}{5 \text{ lbs/A}} = \frac{.5\%}{1.5\%}$ = Ratio of percent solution to pound per acre

X 1.5 = 2.5

X = 1.67 lbs/A of nonionic surfactant

Using this application rate for the surfactant, an estimated environmental concentration (EEC) for water was calculated:

Assumption:

1. 1.67 lbs/A = Application Rate
2. 1 Acre = Drainage Basin Acreage
3. 1% = Runoff Rate
4. 1 A = Surface Area of Water in Acres
5. 0.5 ft = Average Depth in Feet

Equation:

EEC (ppb) = A (pesticide loading to the body of water)/B (weight of the water)

A = maximum application rate (lbs a.i./A) x size of drainage basin (A) x % runoff (decimal)

B = surface area of body of water (A) x average depth (ft) x 43560 $ft^2/A$ x 62.36 $lbs/Ft^3$

$$\frac{.01 \text{ Runoff} \times 1 \text{ Acre} \times 1.67 \text{ lbs/A}}{1 \text{ Acre} \times 0.5 \text{ ft} \times 43560 \text{ ft}^2/\text{A} \times 62.36 \text{ lbs/ft}^3}$$

= 0.068 ppm

If the drainage basin is increased to 5 acres

= 0.34 ppm of surfactant would be expected.

COMMERCIAL/FINANCIAL INFORMATION IS NOT INCLUDED

Minimal hazard would be expected from the aquatic site when water is not present. The EECs ranged from 0.0068 ppm to 0.34 ppm for one (1) and five (5) acre drainage basins, respectively. These values are 1/20 to 1/4 the $LC_{50}$ of the most toxic surfactant tested by Macek and Krzeminski (1975). This surfactant is Surfonic N-40 with an $LC_{50}$ value of 1.3 (1.0-1.5) mg/l. for Bluegill Sunfish. Macek and Krzeminski (1975) report was represented but not a complete test of all the possible nonionic surfactant. It demonstrated variation in toxicity for several different chemical structures. For example, the alcohol ethoxylate surfactants with 9 ethylene oxide units have 96 hr $LC_{50}$s for Bluegill Sunfish as low as 2.1 and higher than 10 mg/l. Also those [redacted] surfactants like Surfonic N-40 [redacted] appears to be even more toxic. Hence, nonionic surfactants show a wide variation in toxicity. However, EEB fish toxicity studies indicate 1/3 the $LC_{50}$ is equal to the $LC._1$ or the no effect level. Concentrations at the 1/4 the $LC_{50}$ would provide a significant safety margin. In addition, this EEC would be lowered by degradation. This is particularly true in cases where the water has been drawn down. Under these conditions the label requires a 7 day period before water can be returned to the area. Based on these items viable aquatic populations are expected to be at minimal risk from the use of Rodeo on aquatic sites.

104.3 Endangered Species Considerations

Endangered terrestrial fauna are not expected to suffer adverse effects when glyphosate is used at aquatic sites with or without water. Both avian and mammalian acute studies indicate the material is practically non-toxic. Studies also demonstrate minimal accumulation of pesticide would be expected. Therefore, minimal hazard is expected for endangered terrestrial fauna.

In regard to aquatic species, the lowest $LC_{50}$ was obtained when the fathead minnow was tested for 24 hours. This $LC_{50}$ was 85 ppm. To adequately protect an endangered population, in which case the loss of one individual may be critical to survival, the no effect level is estimated by 1/20th the $LC_{50}$ or 4.25 ppm. The expected concentration of the active ingredient in water, when the pesticide is applied directly to water, is 2.00 ppm. This estimate assumes the high application rate (5 lbs/A.) to a 6" acre-layer of water. Based on this minimal hazard is expected to endangered aquatic fauna from the active ingredient, glyphosate.

Concerning the Ortho X-77 surfactant, it is much less toxic than glyphosate, and, therefore, would not be expected to reach 1/20th the $LC_{50}$ (glyphosate-7.03% + X-77-0.5% $LC_{50}$ 240 mg/l for rainbow trout).

As mentioned in section 104.2, for aquatic sites, such as ditch banks, where water is not present, the label allows for any nonionic surfactants. The available data indicates that these surfactants vary in their toxicity to Bluegill Sunfish. Therefore, there may be a number of nonionic surfactants more toxic than these tested.

Unfortunately, endangered species populations are not healthy populations. Thus, the loss of one individual can significantly affect the survivability

of the species. Hence, a strict 1/20 $LC_{50}$ value trigger's concerns. The higher value of EEC proposed in the previous section is 0.34 ug/l which is 1/4 the $LC_{50}$. Hence, hazard is expected if the surfactant used is as toxic as Surfonic N-40. Therefore, due to the viability of the species, variability in surfactant toxicity and the lack of data, a precautionary statement requesting the user to consult with federal regional endangered species personnel to avoid spraying areas with sensitive species is indicated. (Also see Bascietto review of 6-14-83 #64)

As a herbicide the fate of endangered plant species may also be jeopardized by this use. Hence, labeling to prevent spraying of these species is indicated. The following is a list of endangered aquatic and semi-aquatic plants.

1. Bunched arrowhead (Sagittaria fasciculata)
2. Truckee barberry (Berberis sonnei)
3. San Diego mesa mint (Pogogyne abramsil)
4. Solano grass (Orcuttia mucronata)
5. Salt marsh bird's beak (Cordylanthus maritimus ssp. maritimus)
6. Furbish lousewort (Pedicularis furbishiae)
7. Texas wild-rice (Zizania texana)
8. Tobusch fishhook cactus (Aneistrocactus tobuschii)
9. Knowlton cactus (Pediocactus knowltonii)
10. MacFarlane's four o'clock (Mirabilis macfarlane)
11. Green pitcher plant (Sarracenia oreophila)

104.4 Adequacy of Toxicity Data

The toxicity data for the active ingredient and Ortho-X77 was sufficient for the review of this use. Little data was available for the nonionic surfactants, as a group.

104.5 Additional Data Required

No further data is required for the hazard assessment of this use.

105 Classification

This product is not sufficiently toxic to required restricted classification.

106 RPAR Criteria

Not Applicable

107 Conclusions

107.1 Environmental Fate and Toxicology Acknowledgement

Environmental Assessment and Toxicology Branches provided data for previous reviews which contributed to the hazard assessment presented in this review.

107.3 Environmental Hazards Labeling

For Endangered Plant Species:

In order that endangered/threatended plant species be protected the label should bear the following statements:

"This product must not be used in areas where adverse impact on Federally designated endangered/threatened plant species is likely.

Prior to making applications the user of this product must determine that no such species are located in or immediately adjacent to the area to be treated."

For Endangered Aquatic Species:

"Prior to applying this product with nonionic surfactants (other than Ortho X-77) to aquatic sites, when water is not present, the user must consult with regional U.S. Fish & Wildlife Service endangered species specialists to determine the potential for hazard to protected aquatic species in nearby ponds."

107.4 Data Adequacy Conclusions

EEB has completed an incremental risk assessment (3(c)(7) finding) of the proposed conditional registration of glyphosate for use on turf. Based upon the available data EEB concludes that the proposed use provides for a significant increase in exposure, but not in risks to nontarget organisms.

Dennis J. McLane Dennis McLane Date: 11/4/83
Wildlife Biologist
Ecological Effects Branch, HED

Raymond W. Matheny Raymond W. Matheny 11/7/83
Head, Sec. 1
Ecological Effects Branch, HED

Clayton Bushong, Chief Clayton Bushong 11/7/83
Ecological Effects Branch, HED