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EE BRANCH REVIEW

DATE: IN 9-6-79 OUT 4-24-80 FISH & WILDLIFE IN _____ OUT _____ ENVIRONMENTAL CHEMISTRY IN _____ OUT _____ EFFICACY

FILE OR REG. NO. 524-GGE

PETITION OR (EXP. PERMIT NO.) _____

DATE DIV. RECEIVED _____

DATE OF SUBMISSION _____

DATE SUBMISSION ACCEPTED _____

TYPE PRODUCT(S): I, D, H, F, N, R, S Plant Growth Regulator

DATA ACCESSION NO(S). _____

PRODUCT MGR. NO. 25

PRODUCT NAME(S) Polado

COMPANY NAME Monsanto Company

SUBMISSION PURPOSE Use on Sugarcane

CHEMICAL FORMULATION Sodium sesqui salt of [N-(phosphono-methyl) glycine]-75%

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POLADO

100. Pesticide Label Information

100.1 Pesticide Use

This product is a foliar applied growth regulator to hasten ripening and increase the level of sucrose in sugarcane. It increases the sucrose content of existing suckers while reducing the size and number of new suckers.

100.2 Formulation Information

Sodium sesqui salt of [N-(phosphonomethyl)glycine]-75%
Inert ingredients-25%

100.3 Application Methods, Directions, Rates

Florida - apply 0.3 to 0.7 pounds of this product per acre 3 to 6 weeks before harvest of last ratoon cane only.

Hawaii - apply 0.5 to 1.2 pounds of this product per acre 4 to 10 weeks before harvest.

Louisiana - apply 0.3 to 0.7 pounds of this product per acre 3 to 6 weeks before harvest of last ratoon cane only .

Texas - apply 0.3 to 0.7 pounds of this product per acre 3 to 6 weeks before harvest of last ratoon cane only.

NOTE: Use the higher rate within the recommended range when treating sugarcane under adverse ripening conditions or when less responsive varieties are to be treated.

Apply the recommended rate of this product in 5 to 10 gallons of water per acre with either airplane or helicopter aerial spray equipment.

100.4 Target Organism

The sugarcane itself is the target.

100.5 Precautionary Labeling

Hazard to humans and domestic animals. Keep out of reach of children.

Do not contaminate water by cleaning of equipment or disposal of wastes. Avoid contamination of seed, feed and foodstuffs.

AVOID DRIFT - Do not apply when winds are gusty or under other conditions which will allow drift. Applications in wind conditions in excess of 5 MPH are not recommended. Do not apply when wind speed is in excess of 15 MPH. Drift may cause damage to any vegetation contacted to which treatment is not extended.

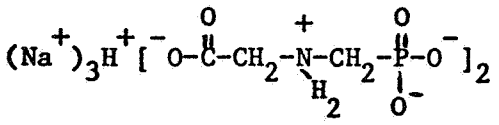
In order to reduce the drift hazard to non-target plants, avoid applying this product within 50 feet of any fields not growing sugarcane.

101. Physical and Chemical Properties

101.1 Chemical Name

Sodium sesqui salt of [N-(phosphonomethyl)glycine]

101.2 Structural Formula



101.3 Common Name

Trisodium diglyphosate

101.4 Trade Name

MON-8000
Polado

102.0 Behavior in the Environment

Since the fate of glyphosate in the environment is unaltered when it is applied as the sodium sesqui salt, new environmental data was not submitted. The following is a brief summary of EFB reviews on Polado (12/21/79) and Round-up(6/30/78, 7/28/78).

102.1 Soil

Studies performed on sterile vs. nonsterile soils indicate that microorganisms contribute significantly to the degradation of glyphosate. In sterile soil glyphosate (MON-0573) is degraded slowly and binds readily to the soil. The major metabolite (methyl phosphonic acid) is also persistent in the soil with only 3%-35% degraded after 63 days. Rates of degradation under anaerobic conditions were not significantly different. Soil binding was dependent on the organic content with the least adsorption and greatest desorption being observed in soils with the least organic matter(sand).

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In soil dissipation studies (nonsterile) degradation of glyphosate varied depending upon soil type. In 10 of the 11 locations the half-life of glyphosate was approximately 1.3 months.

MON-0573 does not leach readily. The greatest mobility occurs in sandy soils where 20% of the applied ^{14}C-activity leached.

102.2 Water

The sodium sesqui salt of glyphosate dissociates immediately in water to glyphosate.

Glyphosate does not hydrolyze at pH values of 3.0, 6.0, and 9.0 at 5°C and 35°C. It also is stable to photolysis on TLC plates. Aerobic aquatic metabolism studies showed a half-life of 7-10 weeks, while anaerobic studies indicated a half-life of 5-7 weeks. The major degradate was identified as aminomethyl phosphonic acid.

102.3 Animal

Glyphosate does not bioaccumulate substantially in fish.

102.4 Microorganisms

Plate counts of extracts from untreated and treated soils showed no effect on soil microorganisms.

103. Toxicological Properties

[(from EEB reviews by McLane (7/13/79 and 8/10/79) and Urban (7/19/78)]

103.1 References from Toxicology Branch

103.1.1 Acute Toxicity Mammal

Acc.#	Animal	Test Type	Chemical
94176	Rat	acute oral 4320 mg/kg	CP67573 tech.
"	Rabbit	acute dermal nonlethal 7940 mg/kg	CP67573 tech.
"	Rabbit	acute oral 3800 mg/kg=76000 ppm	CP67573 tech.
"	Rat	acute oral 4900 mg/kg	MON 2139
"	Rat	acute oral 4040 mg/kg	MON 2139
"	Rabbit	acute dermal >7940 mg/kg	MON 2139
94161	Rat	acute oral 8300 mg/kg	CP50435 metabolite

94176 - Eye irritation (formulation) - rabbits - slightly irritating.

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94161 - Eye irritation (metabolite) - rabbits - slightly irritating. (J. Akerman 10/31/75)

233914 - Rat acute oral 38,000 mg/kg-20% aqueous solution CP76100

103.2 Avian and Aquatic Studies

Organism	Study	Result	Test Material	Validation Category
Bobwhite quail	Subacute Dietary	LC_{50}-4640 ppm	Glyphosate, Tech. 98%	Core
Mallard	Subacute Dietary	LC_{50}-4640 ppm	Glyphosate, Tech. 98.5%	Core
Bobwhite quail	Acute Oral	LD_{50}>3851 ppm	Glyphosate, Tech. 83%	Core
Bobwhite quail	Reproduction	NEL=1000 ppm	Glyphosate, Tech. 83%	Core
Mallard	Reproduction	NEL=1000 ppm	Glyphosate, Tech. 83%	Core
Rainbow Trout	Acute 96-h	LC_{50}=86 ppm 95% C.I. (70-106 ppm)	Glyphosate, Tech.	Core
Bluegill	Acute 96-h	LC_{50}=120 ppm 95% C.I.(111-130 ppm)	Glyphosate, Tech.	Core
Fathead Minnow	Acute 24-h	LC_{50}=84.9 ppm 95% C.I. (72.7-99.3 ppm)	Glyphosate, Tech 93.5%	Core
Bluegill	Dynamic 96-h	LC_{50}>24 ppm	Glyphosate, 96.7%	Suppl.
Daphnia	Acute 48-h	LC_{50}=780 ppm 95% C.I. (696-874 ppm)	Glyphosate, Tech.	Core

103.3 Additional Terrestrial Studies

103.3.1 Terrestrial Phytotoxicity

Glyphosate is generally a non-selective herbicide except for the resistance or tolerance of conifers. This may be due to the reduced surface to volume ratio in comparison to other plants.
(Tice, 1/10/78)

The mode of action is interruption of protein synthesis.
(Holst, R, per. Comm.)

103.3.2 Toxicity to Beneficial Insects

Test: Invertebrates Acute 48-hr. LD_{50}
Results: LD_{50} 100 ug/bee
Validation Category: Supplemental
(R. Balcomb 5/23/78)

103.3.3 Cholinesterase Inhibition

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Cholinesterase Inhibition Study with CP67573 Technical 3/10/75

CP67573 is not a cholinesterase inhibitor in plasma, erythrocytes or brain.

(J. Akerman 10/31/75)

103.4.1 Toxicity to Estuarine and Marine Animals

Organism	Test Type	Results	Formulation	Validation	Acc.#
Atlantic Oysters	48-hr. TL_{50}	10 ppm	Glyphosate 96.7%	Supplemental	94171
Grass Shrimp	96-hr. TL_{50}	281(202-381) ppm	Glyphosate 96.7%	Core	94171
Fiddler Crab	96-hr. TL_{50}	934(555-1570) ppm	Glyphosate 96.7%	Core	94171

103.4.2 Embryo-Larvae and Life-Cycle Studies

Fathead Minnow (Pimephales promelas, Rafinesque), 93.5% glyphosate technical, no significant (P=0.05) effects at 25.7 mg/l dosage level. Validation: Core. Accession No. 097759.

103.5.1 Aerial Drift Studies

Monsanto provided a copy of the following article:

> Yates, W.E., N.B. Akesson, and D.E. Bayer, Drift of glyphosate sprays applied with aerial and ground equipment, Weed Science, Volume 26, Issue 6 (Nov.) 1978 submitted by Monsanto Co. for Reg. No. 524-308 on 5-22-79 Acc. No. 238527.

104. Hazard Assessment

104.1 Discussion

Polado is a foliar applied growth regulator that is to be sprayed onto sugarcane at rates of 0.2 pounds to 0.9 pounds active ingredient per acre depending upon location and ripening conditions. At the maximum application rate the maximum expected residues in the environment are: 215 ppm on vegetation, 20 ppm on the soil surface, and 0.661 ppm in the top six inches of water.

104.2 Likelihood of Exposure to Non-target Organisms

There is minimal hazard to non-target mammals, birds, and aquatic organisms since the maximum residue levels are less than 1/5 the

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mammalian and avian dietary LC_{50} values of 76000 ppm and 4640 ppm, respectively, and less than 1/10 the aquatic acute LC_{50} value of the most sensitive species (rainbow trout - 86 ppm).

Additionally, since glyphosate binds to soil, there are no significant problems associated with runoff.

However, there is the concern that the [redacted] in Polado may present aquatic hazards similar to those caused by the [redacted] another formulation of glyphosate, Roundup (refer to EEB review by McLane, 8/10/79). The major reason for this concern is that sugarcane is commonly grown near bodies of water, for example, around the southern and eastern shores of the Lake Okeechobee in Florida. It is possible that during the aerial application of Polado to sugarcane, that the pesticide could enter the water and cause significant adverse effects to any exposed aquatic organisms.

104.3 Endangered Species Considerations

The critical levels that are used to determine if application of a pesticide will adversely affect endangered species are more stringent than for non-endangered species. However, because the application rates of Polado are relatively low (less than 1 lb active ingredient/acre) as are the maximum residues on vegetation, this product can be considered non-toxic to endangered birds and mammals. However, endangered aquatic species may be affected if [redacted] proves to be highly hazardous. Until the questions concerning [redacted] are resolved, it must be assumed that the aquatic species can be adversely affected. Therefore, the user of this product must contact the Office of Endangered Species and the local Department of Fish and Game to determine if any aquatic endangered/threatened species are located adjacent to the treated areas. This product must not be used in areas where impact of endangered/threatened species is likely.

104.4 Adequacy of Toxicity Data

All data are acceptable.

104.5 Additional Data Required

Because of the concerns regarding [redacted] additional aquatic studies on bluegills and rainbow trout should be conducted with the formulated product.

105.0 Conclusions

The Ecological Effects Branch concurs with the conditional registration of Polado on sugarcane provided that the registrant agrees in writing to the following:

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1. Label restriction(s) for endangered species: The user of this product must contact the Department of Interior's Fish and Wildlife Service, Office of Endangered Species and the local Department of Fish and Game to determine if any aquatic endangered/threatened species are located adjacent to the treated areas. This product must not be used in areas where impact of endangered/threatened species is likely.

2. The registrant performs the following research:

   (a) Acute bioassays with rainbow trout, bluegill sunfish, Daphnia magna, marine fish, shrimp, crabs, and oysters using the formulated product.

   (b) Further research which EEB may require depending upon the results of (2a) above.

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