108801

(9)

EEE BRANCH REVIEW

DATE: IN 12/22/77 OUT 2/13/78 IN _____ OUT _____ IN _____ OUT _____

FISH & WILDLIFE ENVIRONMENTAL CHEMISTRY EFFICACY

FILE OR REG. NO. 100-EUP-61

PETITION OR EXP. PERMIT NO. _____

DATE DIV. RECEIVED _____

DATE OF SUBMISSION _____

DATE SUBMISSION ACCEPTED _____

TYPE PRODUCTS(S): I, D, H, F, N, R, S _____

DATA ACCESSION NO(S). _____

PRODUCT MGR. NO. L. Zink

PRODUCT NAME(S) Dual

COMPANY NAME Ciba-Geigy

SUBMISSION PURPOSE EUP - Sorghum

CHEMICAL & FORMULATION Metolachlor ----------86.5%

Inert ----------13.5%

100.0%

100.0 Pesticidal Use

An EUP is requested for the application of Dual 8E (metalachlor) to sorghum grown for grain or forage. Included in the EUP are the following tank mixes:

(1) Dual 8E + AAtrex 80W, 4L (4LCO), Nine-o

(2) Dual 8E + Milogard 80W or 4L

(3) Dual 8E + Igran 80W

100.1 Application Method/Directions

This product alone or the tank mixtures may be applied in water or in fluid fertilizers with conventional ground sprayers in a minimum of 15 gals. of spray micture per acre. Dual 8E alone or the tank mixtures may also be mixed in water and applied by aircraft with a minimum of 2 gals. of spray mixture per acre.

Application: Apply Dual 8E alone or in tank mixtures with AAtrex, Milogard, or Igran either preplant incorporated or preemergence. Preplant Incorporated: Apply to the soil and incorporate into the top 2 inches before planting, using a disk, harrow, rolling cultivator, or similar implement. Use a preplant incorporated application if furrow irrigation is used or when a period of dry weather after application can reasonalby be expected. If sorghum is to be planted on beds, apply and incorporate after bed formation. Preemergence: Apply to the soil surface at planting, or after planting but before weeds or sorghum emerge.

Sprayer Equipment: Use conventional spray equipment that provides accurate and uniform application. Screens and strainers should be no finer than 50-mesh. Rinse sprayer thoroughly with clean water immediately after use.

Calculate the amount needed for band treatment by the formula:

$$\frac{\text{band width in inches}}{\text{row width in inches}} \times \frac{\text{broadcast rate}}{\text{per acre}} = \frac{\text{amount needed per}}{\text{acre of field}}$$

Note:

Apply Dual 8E alone or in the tank mixtures only when the sorghum seed has been pretreated with CGA-43089 at a rate of 2-2.4 ozs. active ingredient per 100 lbs. of seed.

100.2 Application Rates

Herbicide (s)	Maximum Rate per acre[1]	lbs. a.i./A	ppm * 2" soil sample
Dual 8E	2.5 pts.	2.16	~~2.4~~ 2.8
AAtrex 80W	2 lbs.	1.6	1.8
+	+		
Dual 8E	2 pts.	1.7	~~1.9~~ 2.2
AAtrex Nine-o™	1.8 lbs.	1.6	1.8
+	+		
Dual 8E	2 pts.	1.7	1.9
AAtrex 4L (or 4LC)	3.2 pts.	1.6	1.8
+	+		
Dual 8E	2 pts.	1.7	1.9
Milogard 80W	1.75 lbs.	1.4	1.6
+	+		
Dual 8E	2 pts.	1.7	1.9
Milogard 4L	2.8 pts.	1.4	1.6
+	+		
Dual 8E	2 pts.	1.7	1.9
Igran 80W	2.5 lbs.	2.0	2.2
+	+		
Dual 8E	2 pts.	1.7	1.9

etc. ↓

* Reviewer calculation

[1] Rates vary depending on soil type and organic content...see labels for details.

100.3 Precautionary Labelling

Environmental Hazards

Keep out of any body of water. Do not apply where runoff is likely to occur. Do not contaminate water by cleaning of equipment or disposal of wastes. Do not apply when weather conditions favor drift from areas treated.

Observe all cautions and limitations on labeling of all products used in tank mixtures.

Storage and Disposal

Do not contaminate water, food, or feed by storage or disposal. Open dumping is prohibited. Do not reuse empty container. Pesticide, spray mixture, or rinsate that cannot be used or chemically reprocessed should be disposed of in a landfill approved for pesticides or buried in a safe place away from water supplies. Triple rinse (or equivalent) and dispose of in an approved landfill or bury in a safe place. Consult federal, state, or local disposal authorities for approved alternative procedures.

100.4 Proposed EUP Program

100.4.1 Objectives

1. To gather large plot data to support the full registration of the use of Dual 8E on grain sorghum.

2. To gather large plot data to support the full registration of the following Dual 8E tank mixtures for use on grain sorghum:

   a. Dual 8E + AAtrex 80W, 4L (4LC), or Nine-0.

   b. Dual 8E + Milogard 80W or 4L.

   c. Dual 8E + Igran 80W.

100.4.2 Duration/Date/Amount Shipped/Acreage

States	Approx. Acres To Be Treated	Gals. Dual 8E To Be Used	Gals. Dual 8E To Be Shipped	Lbs. AAtrex 80W	Lbs. AAtrex Nine-0	Pts. AAtrex 4L (4LC)	Pts. Milogard 4L	Lbs. Milogard 80W	Lbs. Igran 80W
Arizona	70	15.3	16		19			15	11
Arkansas	60	13.1	14	22					
California	70	15.3	16			35	24		11
Colorado	60	13.1	14					15	
Georgia	70	15.3	16		19		24		11
Kansas	70	15.3	16	21			24		11
Missouri	60	13.1	14		20				
Nebraska	70	15.3	16			35	24		11
New Mexico	70	15.3	16			35	24		11
North Carolina	70	15.3	16		19			15	11
Oklahoma	60	13.1	14			35			11
South Dakota	70	15.3	16	22				15	11
Texas	70	15.3	16	22				15	11
	870 Acres	190.1 Gals.	200 Gals.	87 Lbs.	77 Lbs.	140 Pts.	120 Pts.	75 Pts.	110 Lbs.

Tests will be established and evaluated during the period of March 1, 1978 to March 1, 1979.

100.4.3 Application Procedures
See sections 100.1 and 100.4.6

100.4.4 Types of Target Pests or Organisms

Weeds including the following:

For Dual 8E Applied Alone

barnyardgrass (watergrass)
crabgrass
cupgrass
fall panicum
giant foxtail
goosegrass
green foxtail
johnsongrass (seedling)
carpetweed
knotweed
lambsquarters
prickly sida
quackgrass
ragweed
pigweed
purslane
signalgrass (Brachiarial)
witchgrass
yellow foxtail
yellow nutsedge
sandbur
shattercane
smartweed
Texas panicum
volunteer sorghum

For Dual 8E + AAtrex 80W, 4L (4LC) or Nine-O

barnyardgrass (watergrass)
crabgrass
cupgrass
fall panicum
giant foxtail
goosegrass
greenfoxtail
johnsongrass (seedling)
quackgrass
carpetweed
cocklebur
coffeeweed
Florida beggarweed
sandbur
shattercane
Texas panicum
pigweed
purslane
signalgrass (Brachiarial)
witchgrass
yellow foxtail
yellow nutsedge
jimsonweed
knotweed
lambsquarters
morningglory
mustards
volunteer sorghum
prickly sida
ragweed
smartweed
sunflower
velvetleaf

For Dual 8E + Milogard 80W or 4L

barnyardgrass (watergrass)
crabgrass
cupgrass
fall panicum
giant foxtail
goosegrass
green foxtail
johnsongrass (seedling)
quackgrass
carpetweed
cocklebur
coffeeweed
Florida beggarweed
sandbur
volunteer sorghum
pigweed
purslane
signalgrass (Brachiaria)
witchgrass
yellow foxtail
yellow nutsedge
jimsonweed
knotweed
lambsquarters
morningglory
mustards
shattercane
prickly sida
ragweed
smartweed
sunflower
velvetleaf
Texas panicum

For Dual 8E + Igran 80W

barnyardgrass
crabgrass
cupgrass
fall panicum
giant foxtail
goosegrass
green foxtail
johnsongrass (seedling)
quackgrass
carpetweed
cocklebur
coffeeweed
Florida beggarweed
sandbur
volunteer sorghum
pigweed
purslane
signalgrass (Brachiaria)
withcgrass
yellow foxtail
yellow nutsedge
jimsonweed
knotweed
lambsquarters
morningglory
mustards
shattercane
prickly sida
ragweed
smartweed
sunflower
velvetleaf
Texas panicum

100.4.5 Geographical Site Features

The sites of application will not be known with certainty until just before application. This information will be included in the periodic reports made during the permit period.

Plot Size: .5 to 5 acres.

100.4.6 Test Program Features

The following treatments will be evaluated in the proposed testing program:

1. Dual 8E with water carrier preplant incorporated.

2. Dual 8E with fluid fertilizer carrier preplant incorporated.

3. Dual 8E with water carrier preemergence.

4. Dual 8E with fluid fertilizer carrier preemergence.

5. Dual 8E + AAtrex 80W with water carrier preplant incorporated.

6. Dual 8E + AAtrex 80W with water carrier preemergence.

7. Dual 8E + AAtrex 80W with fluid fertilizer carrier preplant incorporated.

8. Dual 8E + AAtrex 80W with fluid fertilizer carrier preemergence.

9. Dual 8E + AAtrex 4l (4LC) with fluid fertilizer carrier preplant incorporated.

10. Dual 8E + AAtrex 4L (4LC) with fluid fertilizer carrier preemergence.

11. Dual 8E + AAtrex 4L (4LC) with water carrier preplant incorporated.

12. Dual 8E + AAtrex 4l (4LC) with water carrier preemergence.

13. Dual 8E + AAtrex Nine-O with water carrier preplant incorporated.

14. Dual 8E + AAtrex Nine-O with water carrier preemergence.

15. Dual 8E + AAtrex Nine-O with fluid fertilizer carrier preplant incorporated.

16. Dual 8E + AAtrex Nine-O with fluid fertilizer carrier preemergence.

17. Dual 8E + Igran 80W with fluid fertilizer carrier preplant incorporated.

18. Dual 8E + Igran 80W with fluid fertilizer carrier preemergence.

19. Dual 8E + Igran 80W with water carrier preplant incorporated.

20. Dual 8E + Igran 80W with water carrier preemergence.

21. Dual 8E + Milogard 80W with fluid fertilizer carrier preplant incorporated.

22. Dual 8E + Milogard 80W with fluid fertilizer carrier preemergence.

23. Dual 8E + Milogard 80W with water carrier preplant incorporated.

24. Dual 8E + Milogard 80W with water carrier preemergence.

25. Dual 8E + Milogard 4L with fluid fertilizer carrier preplant incorporated.

26. Dual 8E + Milogard 4L with fluid fertilizer carrier preemergence.

27. Dual 8E + Milogard 4L with water carrier preplant incorporated.

28. Dual 8E + Milogard 4L with water carrier preemergence.

Treatment Nos. 1, 3, 5, 6, 11, 12, 13, 14, 19, 20, 23, 24, 27, and 28 will be applied using both aerial and ground application equipment. Treatment Nos. 2, 4, 7, 8, 9, 10, 15, 16, 17, 18, 21, 22, 25, and 26 will be applied using only ground application equipment.

All treatments will be compared to a commercial standard and untreated control where possible.

101.0 Chemical and Physical Properties

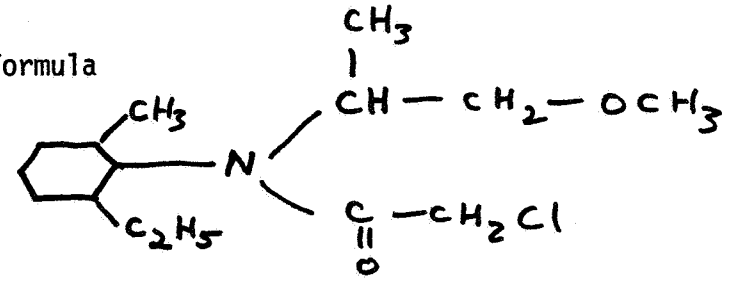
101.1 Chemical Name

2-chloro-N-(2-ethyl-6-methyl phenyl)-N-[2-methyl-1-methylethyl) acetamide.

101.2 Common Name

Metolachlor

101.3 Structural Formula



101.4 Molecular Weight

283.80

101.5 Physical State

Liquid/white to tan/odorless

101.6 Solubility

Metolachlor is soluble in water at the rate of 530 ppm at 20°C. It is miscible with xylene, tolvene, dimethyl formamide, methyl cellusolve, butyl cellusolve, ethylene dichloride cyclohexanone. It is insoluble in ethylene glycol and propylene glycol.

102.0 Behavior in the Environment

Metolachlor has been shown to be persistent in soil (half-life 4-14 weeks depending on soil type) and in water (half-life over 200 days under normal environmental conditions). This chemical is mobile by leaching in soils with the exception of silt loam and muck.

For a detailed review see N. Cook, 100-EUP-38 (1-24-76).

102.4 Special Note: Fish Accumulation

The behavior of Metolachlor in bluegill sunfish, as reported by one study, is summarized in the following table.

	Mean Measured Concentration of ^{14}C-residues in water	
	0.00931 mg/l	1.1317 mg/l
Maximum mean measured concentration of ^{14}C- residue in fish		
(a) Edible portion	0.184 mg/kg	21.23 mg/kg
(b) Viscera	4.74 mg/kg	585.05 mg/kg
Biological magnification (relative to ^{14}C-residues in water)		
(a) Edible portion	20X	19X
(b) Viscera	509X	517X
Residue elimination after 28 days depuration		
(a) Edible portion	56%	46%
(b) Viscera	97%	98%

103.0 Toxicological Properties

103.1 Acute Toxicity

103.1.1 Mammal

Albino rats Oral LD_{50} = 2780 mg/kg

103.1.2 Bird

Mallard acute LD_{50} = 1750 mg/kg

103.1.3 Fish

Ictalurus ameirus (sp.?) 96 hour LC_{50} = 4.9 ppm

Lepomis macrochirus 96 hour LC_{50} ≈ 15.0 ppm

103.1.4 Aquatic Invertebrates

Daphnia magna 48 hour LC_{50} = 25.1 ppm

103.1.5 Metolachlor is phytotoxic to a variety of grasses and broadleaf plants as indicated by the list of plant weed species controlles (§100.4.4). No data is presently available to determine no-effect/threshold levels or GR_{50}/EC_{50} (50 percentile reduction) levels of growth.

A seed safener is needed to protect sorghum from phytotoxic effects induced by metolachlor.

103.2.0 Dermal Toxicity

103.2.1 Mammal

The acute dermal LD_{50} of technical metolachlor to albino rabbits was determined to be > 10,000 mg/kg.

103.3 Subacute Toxicity

103.3.2 Bird

Bobwhite LC_{50} > 10,000 ppm

Mallard LC_{50} > 10,000 ppm

104.0 Hazard Assessment

104.1 Discussion

The toxicity of metolachlor to birds and mammals is low and given the rates of application (< 2.4 ppm in 2" soil sample) and the methods of application (preplant incorporated or preemergence broadcast) little contamination of food or habitat should occur.

Testing data also raise little concern over this chemical hazard to aquatic invertebrates: Daphnia magna 48 hour LC_{50}= 25.1 ppm.

A potential problem does exist for this chemical, however, concerning its tendency to bioaccumulate in fish. Metolachlor is only moderately toxic to fish in acute toxicity terms (5-15 ppm - 96 hour) but its stability in soil and water coupled with its bioaccumulative properties require that we access the hazard carefully. Chronic avian and fish studies were requested in previous reviews (T. O'Brien 7/27/77, N. Cook 8/12/75 respectively) but have not been received at

the time of this report.

The three herbicides to be tested with Dual via tank mixes (Aatrex, Igran and Milogard) are already registered for use on sorghum.

104.1.1 Likelihood of Non-Target Exposure

The proposed EUP does not present any unreasonable hazard to wildlife. The required additional testing must be reviewed prior to full registration.

104.1.2 Endangered Species Considerations

The application of this product, in accordance with label directions and precautions, to 870 acres of sorghum should not adversely affect any endangered species.

104.1.3 Adequacy of Toxicity Data

No new data was reviewed, see previous reviews for data discussions.

104.1.4 Additional Data Required

See conclusions

107.0 Conclusions

The Environmental Safety Section concurs with the proposed Experimental Use Permit for testing Dual and tank mixes of Dual (with AAtrex, Milogard and Igran) on sorghum.

Prior to consideration of registration of the proposed use certain basic studies are required:

(a) the avian acute oral LD_{50} for one species of waterfowl (Mallard Duck, preferably) or one species of upland game bird (Bobwhite Quail or Ring-necked Pheasant);

(b) the 96-hour LC_{50}'s for a coldwater species (Rainbow Trout) ~~and a warmwater species (Bluegill Sunfish) of fish;~~ HTC

The above basic studies are required on the technical of each active ingredient.

In addition to the basic studies chronic Fish (one species)

and chronic avian studies (Bobwhite Quail and Mallard Duck) were previously requested and will be required for registration of the proposed use.

The following phytotoxicity study is also required:

Aerial application drift assessment as requested by the Herbicide Efficacy Section using the Interim Procedures for Determining Effects of Phytotoxicant Drift on Nontarget Plant Species.

Richard Balcomb HTC

Richard Balcomb
Environmental Safety Staff
EEEB-RD WH567

February 13, 1978