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EEE BRANCH REVIEW

DATE: IN 11/25/75 OUT 1/7/76 IN _____ OUT _____ IN _____ OUT _____

FISH & WILDLIFE ENVIRONMENTAL CHEMISTRY EFFICACY

FILE OR REG. NO. 241-ELN

PETITION OR EXP. PERMIT NO. 6F1703 (Esp. Section "C")

DATE DIV. RECEIVED 11/14/75

DATE OF SUBMISSION 11/14/75

DATE SUBMISSION ACCEPTED _____

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

PRODUCT MGR. NO. 23

PRODUCT NAME(S) Avenge (wild oat herbicide)

COMPANY NAME American Cyanamid Co.

SUBMISSION PURPOSE Reg. - BARLEY

CHEMICAL & FORMULATION Difenzoquatmethyl sulfate

(1,2-dimethyl-3,5-diphenyl-1H-pyrozolium methyl sulfate)

1 gallon contains 2 lbs. of difenzoquat cation.

ENVIRONMENTAL SAFETY REVIEW

100.0 Pesticidal Use: Avenge - wild oat herbicide

AVENGE is a selective herbicide for the postemergence control of wild oats in barley, fall-seeded wheat, all varieties of spring-seeded wheat in the Western United States, and certain spring and durum wheat varieties grown in Montana, North Dakota, South Dakota, and Minnesota. If broadleaf weeds must also be controlled in these crops, AVENGE may be tank-mixed with MCPA, bromoxynil, or MCPA plus bromoxynil. AVENGE, alone or in combination, can be applied postemergence by air or ground equipment.

AVENGE or AVENGE tank-mix combinations are to be applied when the majority of wild oat plants are in the three to five leaf stage of growth. The 3-leaf growth stage of wild oats occurs usually about 9 days following plant emergence under normal growing conditions. The timing of AVENGE application to wild oats frequently coincides with barley in the 2 to 7-leaf stage, spring-seeded wheat in the 5 to 6-leaf stage, and fall-seeded wheat in the 4-leaf to tillered stage of growth. To achieve maximum control, the growth stage of wild oats in each field t to be treated should be examined frequently to determine the 3 to 5-leaf stage for proper timing of AVENGE application. Density of wild oat population per square foot should also be noted to select the correct AVENGE application rate.

Maximum control of wild oats in barley and wheat with AVENGE, alone or in combination, is obtained when temperature, moisture, fertility, and cultural practices provide favorable conditions for plant growth. When applied under stress conditions for plant growth such as cold/wet or hot/dry weather or low soil fertility, AVENGE or AVENGE tank-mix combinations have produced yellowing or slight tip burn of barley or wheat, but crop recovery has been rapid when good growth conditions return.

100.1 Application Methods/Directions and Rates

As per the current proposed label:

DIRECTIONS FOR USE

WHERE TO USE AVENGE: AVENGE and AVENGE tank-mix combinations listed below may be applied to:

1. Barley and Fall-seeded Wheat Varieties grown throughout the United States.

2. Spring-seeded Wheat (Western States): All varieties grown in Arizona, New Mexico, California, Utah, Nevada, Idaho, Oregon and Washington.

3. Spring-seeded Wheat (North Central States): Use only on the spring wheat varieties ERA and RR 68 (Red River 68) and durum wheat varieties Bono, Hercules, Leeds, Rolette, Ward, and Wells grown in Montana, North Dakota, South Dakota and Minnesota.

HOW TO USE AVENGE ALONE AND WITH BROADLEAF HERBICIDES

AVENGE TO CONTROL WILD OATS ONLY: If vegetation is growing vigorously, select the proper application rate from the AVENGE Recommendation Table that relates to the population density of wild oat plants per square foot in the field to be treated. Under stress conditions of plant growth, apply AVENGE at the rate of 4 pints per acre for all levels of wild oat plants per square foot.

Apply AVENGE in 5 to 20 gallons of water per acre in ground equipment or 3 to 10 gallons of water per acre by aerial application. Do not apply during periods of gusty winds. Do not apply when winds are in excess of 5 mph by aerial application or 10 mph by ground equipment.

AVENGE Recommendation Table

Wild Oat Population	Wild Oat Plants Per Square Foot	AVENGE Rate Per Acre
Low	1-10	2 1/2 pints
Moderate	11-25	3 pints
High	more than 25	4 pints

Note: For spray volumes in excess of 10 gallons of spray per acre (gpa), the addition of surfactant: Triton X-100 or Surfonic N-95, or Tergiton NPX or Colloidal X-77, at 0.6 fluid ounces per gallon of spray in excess of 10 gpa is necessary. Example: For a 15 gpa spray add 3 fluid ounces of surfactant (0.6 ounces for each gallon of water over 10 gpa) to each 15 gallons of water.

AVENGE WITH BROADLEAF HERBICIDES: Select the proper AVENGE application rate as described in the AVENGE Recommendation Table. Follow the Mixing Instructions and add the broadleaf herbicide as follows:

AVENGE PLus MCPA Amine or Ester: Use the MCPA formulation at the rate of 0.25 to 1.0 lb. acid equivalent per acre in accordance with the manufacturer's label recommendations. Apply in 5 to 20 gallons per acre by ground equipment and 3 to 10 gallons per acre by aircraft.

AVENGE Plus Bromoxynil: Use bromoxynil at the rate of 0.375 to 0.5 lb active ingredient per acre in accordance with the manufacturer's label recommendations. Apply in 10 to 20 gallons per acre by ground equipment and 3 to 10 gallons per acre by aircraft.

AVENGE Plus MCPA Plus Bromoxynil: Use bromoxynil at the rate of 0.25 to 0.5 lb. active ingredient per acre plus MCPA at 0.25 to 0.5 lb. acid equivalent per acre in accordance with the manufacturer's label recommendations. Apply in 10 to 20 gallons per acre by ground equipment and 3 to 10 gallons per acre by aircraft.

Note: When applying more than 10 gallons of spray per acre, follow instructions relating to addition of surfactant as described under AVENGE Recommendation Table.

101.0 Chemical and Physical Properties

Refer to previous review for Avenge 2A-S (in the Environmental Safety Review staff's fish and wildlife data files, under Avenge).

102.0 Behavior in the Environment

Refer to previous review and data (in the Environmental Safety Review staff's fish and wildlife files, under Avenge).

103.0 Toxicological Properties

Refer to previous review and data (in the Environmental Safety Review staff's fish and wildlife files, under Avenge).

104.0 Hazard Assessment

104.1 Discussion: As per information submitted by Cyanamid Co.:

Summary

AVENGE is a quaternary salt which is highly water soluble, partitions strongly in favor of water, has negligible vapor pressure and is quite stable to hydrolytic conditions. It is strongly absorbed to soil particles and does not leach or run off appreciably. It is readily degraded photolytically as thin films on glass and soils to yield the demethylated tertiary amine analog (which is volatile and only slightly toxic) and small amounts of hydroxylated analogs which retain the quaternary group; in water solution the tertiary amine is not formed but the other products are the same. AVENGE is metabolically inert and is not degraded by biological systems. It is excreted intact and is not accumulated in the tissues of exposed animals. It disappears from plant and soil surfaces primarily by the demethylation-volatilization mechanism and does not leave significant non-AVENGE residues. Under realistic conditions, follow-crops do not take up significant residues from soil treated the previous season. Apparent AVENGE residues in soil are not significantly altered when used as a tank-mix combination with MCPA, bromoxynil or MCPA plus bromoxynil (Bronate). AVENGE does not persist in an aquatic environment and has a low order of acute toxicity to fish. AVENGE does not accumulate in fish and is relatively non-toxic to mallard ducks, bobwhite quail or honey bees.

104.1.1 Adequacy of Toxocity Data: satisfactory

104.1.2 Additional Data Required: An aquatic invertebrate 48 hr. acute toxicity study, preferably on dapnia, and an acute LD_{50} study on either of the two species of birds utilized in the LC_{50} dietary studies, preferably mallard ducks.

104.1.3 Likelihood of Exposure to Non-Target Organisms:

Ground and aerial applications to barley and wheat crop cultures contain a high degree of exposure potential to a diversified amount of non-target organisms, both aquatic and terrestrial.

105.0 Conclusions

Section III regulations stipulate basic, data requirements, which are not yet satisfied - refer to section 104.1.2.

The basic Environmental precautionary statements must appear on the label in a separate paragraph, set apart from the other precautions and use directions, under the heading, "Environmental Hazards" add the following:

> Keep out of lakes, streams and ponds. Do not apply when weather conditions favor run-off and/or drift from target area. Do not contaminate water by cleaning of equipment or disposal of wastes.

Upon submission of the basic testing required, the Environmental Safety evaluation of the candidate material can be completed.

Scott Fredericks

Scott Fredericks 1-7-76
Environmental Safety
EEE Branch

From 241-EUP-64G LABEL
10-16-75

Tank-Mix of AVENGE 2A-S Plus MCPA amine or MCPA esters:

AVENGE 2A-S Rate: Select the proper AVENGE 2A-S rate of application from the AVENGE 2A-S Recommendation Table based upon the noted infestation of wild oats.

MCPA Rates: Use either an amine or ester formulation at 0.25 to 1.0 lb/A MCPA acid equivalent in accordance with the label recommendations for the particular formulation. Apply in 5 to 20 gallons of water by ground application and 3 to 10 gallons of water by aircraft. MCPA is the common name for 2-methyl-4-chlorophenoxy acetic acid.

Tank Mix of AVENGE 2A-S Plus Bromoxynil:

AVENGE 2A-S Rate - Select the proper AVENGE 2A-S rate of application from the AVENGE 2A-S Recommendation Table based upon the noted infestation of wild oats.

Bromoxynil Rate - Apply bromoxynil at 0.375 to 0.5 lb/A active ingredient in 10 to 20 gallons of water by ground application or 5 to 10 gallons of water by aircraft. Select proper rate in accordance with the label recommendation for bromoxynil. Bromoxynil is the common name for 3,5-dibromo-4-hydroxy-benzonitrile.

Tank-Mix of AVENGE 2A-S Plus MCPA Plus Bromoxynil:

AVENGE 2A-S Rate: Select the proper AVENGE 2A-S rate of application from the AVENGE 2A-S Recommendation Table based upon the noted infestation of wild oats.

MCPA plus Bromoxynil Rate: MCPA as butoxyethanol ester or isooctyl ester at 0.25 to 0.5 lb/A of MCPA acid equivalent plus bromoxynil at 0.25 to 0.5 lb/A active ingredient.

Apply in 10 to 20 gallons of water for ground application or 5 to 10 gallons of water by aircraft. Select proper rate in accordance with the label recommendation for the specific formulation.

DO NOT ALLOW LIVESTOCK TO GRAZE ON FIELDS SPRAYED WITH AVENGE 2A-S UNTIL AFTER HARVEST OF THE CROP.

DO NOT PLANT SUBSEQUENT CROPS FOR 18 MONTHS EXCEPT BARLEY AND WHEAT.

EPA Temporary Permit No. 241-Exp-64G

In case of an emergency endangering life or property involving this product, call collect, day or night, Area Code 201-835-3100.

AMERICAN CYANAMID COMPANY
AGRICULTURAL DIVISION
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