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

January 7, 1988

OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: Transmittal of Qualitative Use Assessment (QUA) for Difenzoquat Methyl Sulfate (106401)

FROM: Dennis Szuhay, Plant Physiologist
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Dennis Szuhay

TO: ADDRESSEES

THRU: Janet L. Andersen, Ph.D.
Acting Chief, Plant Biology Section
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Attached is the QUA for Difenzoquat methyl sulfate (106401). The information in this report is current as of December, 1987. This report contains no Section 7 or company submitted data classified as CBI.

If there are any questions, please contact me in room 1024C, or at 557-1659.

Attachment

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QUALITATIVE USE ASSESSMENT

OF

DIFENZOQUAT METHYL SULFATE

(106401)

SCIENCE SUPPORT BRANCH
BENEFITS AND USE DIVISION
OFFICE OF PESTICIDE PROGRAMS
U.S. ENVIRONMENTAL PROTECTION AGENCY

January 1988

Qualitative Use Assessment

of

Difenzoquat Methyl Sulfate

(106401)

Dennis W. Szuhay
Plant Physiologist

Science Support Branch
Benefits and Use Division
Office of Pesticide Programs
U.S. Environmental Protection Agency

January 1988

I. Introduction

Difenzoquat is the American National Standards Institute (ANSI) common chemical name for 1,2-dimethyl-3,5-diphenyl-1H-pyrazolium. It is marketed under the trade name Avenge® which contains the methyl sulfate salt of difenzoquat (EPA chemical code 106401).

II. Herbicidal Activity

Difenzoquat is readily absorbed by plants and is not significantly metabolized or further degraded by them. The herbicidal mode of action of difenzoquat is not currently understood. It is strongly adsorbed to soil particles, resulting in little leaching and movement through runoff. It is not significantly metabolized by microorganisms, but is readily demethylated photolytically to the relatively volatile monomethyl pyrazole. Its soil residues, consequently, disappear at a moderate rate allowing rotation to other crops the following year (WSSA, 1983).

III. Use Summary

The only federally registered use sites for difenzoquat methyl sulfate are the agricultural food crops, barley and wheat. A Special Local Needs registration exists for its use on alfalfa seed crops in Kings County, California. Of the current total annual usage of about 380,000 pounds of the active ingredient, approximately 74 percent is applied to wheat, with the remainder being applied to barley and alfalfa. Only 1 percent of the barley crop, and less than 1 percent of the wheat crop, are treated annually with difenzoquat. The predominate usage areas are the north central, and western United States. The usage on the California alfalfa seed crop is minor (Hogue, 1987).

Table 1 lists the registered products containing difenzoquat methyl sulfate by formulation. The end-use products are either 2 pound active ingredient (cation) per gallon liquid soluble concentrates (SC/L), or a 62.5 percent active ingredient (cation) solid soluble concentrate (SC/S). The products are applied once per growing season at rates of 0.6 to 1.0 pounds active ingredient per acre (a.i./A) in barley and wheat. The higher dosage is only used to control heavy infestations of more than 25 wild oat plants per square foot. Applications are made in 5 to 20 gallons of water per acre with ground equipment, or in 3 to 10 gallons of water by air. Spray volumes in excess of 10 gallons of water per acre require the addition of a surfactant (EPA Index to Pesticide Chemicals, 1987).

The only pest claim on Avenge® end-use products is for the control of wild oats (Avena fatua L.) which is one of the most serious annual weeds in the hard red spring wheat area. Wild oat is an annual grassy weed with growth habits similar to those of small grains. It germinates and emerges at approximately the same time as small grain and matures somewhat earlier than most varieties. Some wild oat seeds shatter before harvest and fall to the ground, others are left on the ground by harvesting and threshing operations, and still others are harvested and threshed with the grain. Small grains have a competitive advantage over wild oats early in the season. Wild oat seeds germinate and emerge unevenly, and have a smaller root system than that of wheat and, especially, barley shortly after emergence. However, the root system of a wild oat plant develops faster than that of a small grain plant, and equals that of most wheat varieties in 4 or 5 weeks, and that of barley in 6 weeks. At this time the extensive, fibrous root system of the wild oat gives it the

competitive advantage and it maintains that advantage until maturity (South Dakota State University, undated). Wild oat is found throughout the United States except along the southern Atlantic coast, the Gulf States, and the southern Great Plains into Texas. It is most prevalent in Montana, North Dakota, and Minnesota (USDA, 1971).

Difenzoquat should be applied postemergence when wild oats are in the 3- to 5-leaf stage (tillering) and while barley is in the 2- to 7-leaf stage, spring-seeded wheat is in the 5- to 6-leaf stage, or fall-seeded wheat is in the 4-leaf to tiller stage. Difenzoquat may be used on all varieties of barley; wheat varieties should be varified on product labels prior to treatment (see Table 2).

Since difenzoquat is highly selective in its weed control, it is likely to be tank mixed with various broadleaf herbicides such as the amine or ester formulations of MCPA (2-methyl-4-chlorophenoxyacetic acid), bromoxynil, MCPA plus bromoxynil, the amine or ester formulations of 2,4-D (2,4-dichlorophenoxyacetic acid), chlorsulfuron, or metsulfuron methyl. Optimum weed control is obtained when temperature, moisture, fertility, and cultural practices provide favorable conditions for plant growth. Applications made under cold and wet, or hot and dry conditions, or under low soil fertility, may produce yellowing or slight tip burn on barley or wheat. Recovery is rapid when good growing conditions return, but a slight yield reduction may result.

Table 1. Listing of Registered Products Containing Difenzoquat Methyl Sulfate (106401).

FORMULATION AND REGISTRATION NUMBERS	PRODUCT NAME	MANUFACTURER
96% Technical Chemical		
000241-00239	Avenge Technical Herbicide	American Cyanamid Company
31.2% (2 lb. cation/gal) Soluble Concentrate/Liquid		
000241-00266	Avenge Wild Oat Herbicide	American Cyanamid Company
31.8% (2 lb. cation/gal) Soluble Concentrate/Liquid		
000241-00250	Avenge 2AS Wild Oat Herbicide	American Cyanamid Company
CA770540	Avenge 2AS Wild Oat Herbicide	American Cyanamid Company
MT790011	Avenge 2AS Wild Oat Herbicide	American Cyanamid Company
62.5% Soluble Concentrate/Solid		
000241-00262	Avenge S Wild Oat Herbicide	American Cyanamid Company

Table 2. Wheat varieties that can be treated with difenzoquat (Source: Avenge® Wild Oat Herbicide label (EPA Reg. No. 241-266).

WHEAT TYPE	CAN BE TREATED		CANNOT BE TREATED
Fall- and winter-seeded	All	EXCEPT	Borah, WS 1809, WS 1859, WS 1877, Probrand 771, Klasic, Tadinia, and Mexican durums
Soft-White Spring-Seeded	All		
Spring-seeded durums	All	EXCEPT	Edmore, Kyle, Laker, Lakota, Vic, Wakooma, Wascona, Westbred 803, and Westbred 881
Hard Red Spring-seeded	Apex, Benito, Buckshot, Butte, Canuck, Centa, Chester, Columbus, Coteau, Courtney, Era, Erik, Fortuna, Glenlea, Glenman, HY320, Katepwa, Kitt, Leader, McKay, Marberg, Marshall, Newana, Neepawa, NK(PB) 751 Norak, Norana, Olaf, Olso, Pioneer 2369, Pondera, Probrand 711, Probrand 715, Prodax, Selkirk, Solar, Stoa, Success, Victory, Walera, and Wheaton		DO NOT treat varieties of hard red spring wheat not listed.

REFERENCES

EPA Index to Pesticide Chemicals. Entry for Difenzoquat Methyl Sulfate (106401). U.S. EPA, Office of Pesticide Programs, Benefits and Use Division, Science Support Branch. Issued 9-18-87.

Hogue, Joseph E., Preliminary Quantitative Usage Analysis of Difenzoquat. U.S. EPA, Office of Pesticide Programs, Benefits and Use Division, Economic Analysis Branch. November, 1987.

South Dakota State University. Wild Oats. USDA, Cooperative Extension Service. Undated.

USDA. Common Weeds of the United States. USDA, Agricultural Research Service, Dover Publications, Inc., 1971. 463 pp.

Weed Science Society of America (WSSA). Herbicide Handbook. Fifth Edition, 1983. 515 pp.

American Cyanamid Product Label. Avenge® Wild Oat Herbicide (EPA Reg. No. 241-266), EPA Acceptance Stamp dated Feb. 17, 1987.