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EEE BRANCH REVIEW

3/6/1978

DATE: IN 2/28/78 OUT 3/6/78 IN _____ OUT _____ IN _____ OUT _____

FISH & WILDLIFE ENVIRONMENTAL CHEMISTRY EFFICACY

FILE OR REG. NO. Section 18

PETITION OR EXP. PERMIT NO. _____

DATE DIV. RECEIVED 2/22/78

DATE OF SUBMISSION _____

DATE SUBMISSION ACCEPTED _____

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

DATA ACCESSION NO(S). _____

PRODUCT MGR. NO. Touhey, James

PRODUCT NAME(S) Goal

COMPANY NAME USDA, Plant Protection and Quarantine

SUBMISSION PURPOSE SECTION 18 - Control of Witchweed in corn North + South Carolina

CHEMICAL & FORMULATION 2-chloro-1-(3-ethoxy-4-nitrophenoxy)-4-trifluoromethyl benzene

1

100 Pesticide Use

As a herbicide to control witchweed in corn. Witchweed is a parasite plant the roots of which intertwine with those of grasses in the field and draw nutrients from them. To control witchweed, the host plant must be eradicated or a directed contact herbicide for witchweed be used. Goal as a single or double application is recommended for the control of witchweed in place of repeated applications of paraquat and 2,4-D which did not provide good control.

100.1 Application Method/Directions

Treatment of witchweed with Goal in corn fields will begin in May and continue until August. No more than two applications will be made during the year. The first application can be made in May or June after the emergence of the corn and before the emergence of witchweed. Three-fourths to one pound will be used at that time. If necessary, a second application of one-half to one pound can be made in July or August.

A total of 15,000 pounds of Goal will be applied on 10,000 acres of corn. Treatment will be a directed spray to the soil surface and target weed by ground equipment during May, June, July and August. Pressure will not exceed 25 pounds per square inch.

100.4 Proposed Program

This section 18 calls for the use of Goal on witchweed in a contiquous 30 county area of North and South Carolina.

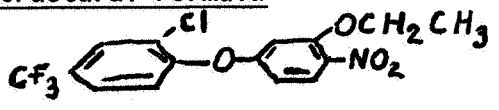
101.1 Chemical Name

2-chloro-1-(3-ethoxy-4-nitrophenoxyl)-4-trifluoromethyl benzene.

101.2 Common Name

Oxyfluorfen Goal 2 E. RH-2915. Goal is in a chemical grouping called the diphenyl ethers.

101.3 Structural Formula



101.4 Molecular Weight

361.72

2

101.5 Physical State

Vapor Pressure: 2×10^{-6} Torr at 25°C.

101.6 Solubility

< 0.1 ppm in water at 25°C. Soluble in most organic solvents.

102.0 Behavior in the environment

102.1-2 Soil, Water

Goal appears to be degraded almost exclusively by photolysis under environmental conditions. In a study by Fadayomi and Warren (1977), it was determined that oxyfluorfen was readily absorbed by muck soil, and Ca- and H-Al-bentonite clays (95 to 100% of the applied quantity). It was not readily desorbed by repeated washings and did not readily leach (less than 2%).

Fadayomi, O., and G. F. Warren. 1977. Adsorption, desorption, and leaching of nitrofen and oxyfluorfen. Weed Sci. 25:97-100.

102.3 Plants

In a study by Fadayomi and Warren (1977), the extent of uptake and translocation by ^{14}C-labelled oxyfluorofen in sorghum and pea was determined. Less than 2% of the total applied material was translocated from the roots from application through nutrient solution and less than 1% of the material was translocated after foliar application.

Fadayomi, O., and G. F. Warren. 1977. Uptake and translocation of nitrofen and oxyfluorfen. Weed Sci. 25:111-114.

103.1 Acute Toxicity

103.1.1 Mammal

Rat LD_{50} = 5.8 $\pm$ 0.21 gm/kg(24 hr with 24.3% a.i.)

3

103.1.2 Bird

No acute oral data available.

103.1.5 Phytotoxicity R.W. Holst 28 Feb 78

Test: Oxyfluorfen (formulated EC) on four Leguminosae species

Species: Glycine max (soybean)
Phaseolus vulgaris (greenbean)
Phaseolus coccineus (scarlet runner bean)
Pisum sativum (pea, 'Alaska')

Results: In a greenhouse study, the I_{50}'s were:

	I50 (kg ai/ha)
Preemergence	
Greenbean	0.6
Soybean	> 4.5
Pea	2.8
SR bean	> 4.5
Postemergence	
Greenbean	0.06
Soybean	0.14
Pea	0.41
SR bean	0.06

The preemergence study utilized pots containing a silt loam (pH 6.6, 2.3% organic matter). For the postemergence study, a soil-perlite mixture (3:1 v/v) was used.

In two field studies, the I_{50}'s were:

	I_{50} (Kg ai/ha)		
	Surface (Preemergence)	Shallow (PPI)	Due
Soybean	0.46	0.25	0.56
Greenbean	0.06	0.07	0.19
Digitaria sanguinalis + Eragnostis cilianensis (grass mixture)	0.03	0.06	0.11

The field studies were done from 12 June to 10 July 1974 in central Indiana on an Ockley silt loam (pH 6.0, 2.5% organic matter). In both greenhouse and field studies, the herbicide was watered in.

4

Reference: Fadayomi, O., and G. F. Warren. 1977. Differential activity of three diphenyl ether herbicides. Weed Sci. 25:465-468.

Abstract: There is no direct relationship between pre- and postemergence treatment. Plant injury was reduced with deep incorporation possibly due to a dilution factor with the soil mixing.

In a second oxyfluorfen study (Fadayomi and Warren, 1977), the following concentrations were determined to cause a 50% reduction in fresh weight (ED_{50}) of sorghum seedlings under controlled growth chamber conditions (16/8;D/N photoperiod; 35klux; 30/20, D/N temperatures):

	ED_{50}	pH (end)
Silica sand	289 ppm	6.7
Silica sand + 1% muck	3979 ppm	5.2
Silica sand + 1% Ca-kaolinite	542 ppm	6.7
Silica sand + 1% H-AL-kaolinite	470 ppm	6.3
Silica sand + 1% Ca-bentonite	398 ppm	6.8

Reference: Fadayomi, O., and G. F. Warren. 1977. Adsorption, desorption, and leaching of nitrofen and oxyfluorfen. Weed Sci. 25:97-100.

The problem with Goal is not its first year application but its application in succeeding years due to the long half life and degradation only by light. It appears that crops other than corn or sorghum such as soybeans or greenbeans and possibly cotton could not be grown in treated fields the succeeding years without some injury to the emerging plant. The residual control of witchweed in 1973 to 1975 is eluded to in the USDA EUP for Goal (707-EUP-82) for witchweed control in corn.

103.3 Subacute Toxicity (from 707-EUP-82, 83)

Birds - 8 Day Dietary LC_{50}

Mallard Duck > 4000 ppm
Bobwhite Quail: 390.00 $\pm$ 22.7 ppm

5

107.0 Conclusion

The Environmental Safety Section realizes that witchweed is a major parasitic problem, not easily eradicated by presently used methods (paraquat + 2,4-D-sequential application and cultivation). The proposed program seems designed to slow the spread of witchweed rather than to erradicate it, however. Presumably, only a few witchweed plants were originally introduced into the United States and it has already spread to approximately 30 counties. The proposed program will probably leave thousands of witchweed plants alive. One could, therefore, infer that the possibility of geographically confining witchweed with the proposed program is small. For this reason the Environmental Safety Staff recommends that a program designed to totally eradicate witchweed be conducted before the problem becomes unmanageable in scope.

The hazard to wildlife would certainly not be unreasonable if the possibility of eradicating witchweed was high. The herbicide spray is directed toward the witchweed and what falls to the ground would become closely bound to it. Birds and mammals may be exposed to residues on the forage within the corn fields but they have a high dietary tolerance for Goal. Fish are not resistant to poisoning by Goal but leaching to natural waterways should be negligible. Any widespread use of a herbicide has some deleterious effect on wildlife. It is unfortunate that the proposed program will have to be enlarged as witchweed spreads as it almost surely will.

The Environmental Safety Section does not object to the proposed Section 18 program as no unreasonable hazard to nontarget plants adjacent to the treated area or wildlife in the treated area is foreseen.

R. W. Holst

R. K. Hitch

R. K. Hitch
Environmental Safety Section
EEEB-RH
March 6, 1978

6

Note To Product Manager

The reviewers recommend that this Section 18 application be routed thru Environmental Chemistry Section which has jurisdiction with regard to the following data gaps:

1. The question of whether or not phytotoxic residues will build up in the soil with the year to year use of Goal should be answered (see Section 103.1.5)

2. If such residues are to be expected then a residue monitoring program should be planned by Environmental Chemistry.

ROUTING AND TRANSMITTAL SLIP

Date

TO: (Name, office symbol, room number, building, Agency/Post)	Initials	Date
1. Frank - Hwy Crops		
2.		
3.		
4.		
5.		

Action		File		Note and Return	
Approval		For Clearance		Per Conversation	
As Requested		For Correction		Prepare Reply	
Circulate		For Your Information		See Me	
Comment		Investigate		Signature	
Coordination		Justify			

REMARKS

cc 18 -- RH-2915 (Goal) on corn to control witchweed. Permits have been issued for last 2 years on corn (707-EUP-82G) and soybeans (707-EUP-83). Temporary tolerances have been established @ 0.05 ppm on corn and soybeans (PP5G1581)

DO NOT use this form as a RECORD of approvals, concurrences, disposals, clearances, and similar actions

FROM: (Name, org. symbol, Agency/Post)	Room No.—Bldg.
Dick Fournier Special Registration Br.	E313
	Phone No. 557-4

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OPTIONAL FORM 41 (Rev. 7-76)
Prescribed by GSA
FPMR (41 CFR) 101-11.206

8

UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
WASHINGTON, D. C. 20250

February 22, 1978

Mr. Thomas E. Adamczyk
Environmental Protection Agency
Room 129
401 M Street, SW.
Washington, DC 20460

Dear Mr. Adamczyk:

Enclosed is a request for specific exemption in accordance with Section 18, Part 166.3 of the Federal Insecticide, Fungicide and Rodenticide Act to include the chemical RH-2915 (Goal) in the witchweed eradication program in North Carolina and South Carolina.

The inclusion of "Goal" in this program will permit treatment of corn acreage where, in the opinion of the Plant Protection and Quarantine personnel, the use of existing registered compounds will provide inadequate or incomplete control or where wet fields or crop lodging prevent necessary treatments.

Because "Goal" has residual preemergence control of witchweed, previous eradication efforts will not be lost due to wet fields or lodging. 2,4-D and paraquat treatments must be terminated when lodged or wet fields are encountered. Consequently viable witchweed seed are produced and previous eradication efforts are lost. There is no herbicide registered and available to substitute for the "Goal" use pattern.

The manufacturing company has developed data which has been supplied to you to support this use pattern and you will receive a registration application this spring.

Your early consideration of this request would be appreciated. If you have any questions, please contact me at Area Code (202) 447-5601.

Sincerely,

J. W. Gentry
Acting Deputy Administrator
Plant Protection and Quarantine Programs

2/23/78

Enclosure

9

RECEIVED
2/22/78

Witchweed-Striga asiatica (L.) O. Kuntze

The Federal Insecticide, Fungicide, and Rodenticide Act, as amended, Section 18

Section 18, Part 166.3--Specific Exemption Request

1. Witchweed presents a serious threat to the production of corn, sorghum, and sugarcane in the United States. These crops have an anrual value in the United States of more than $16 billion. Witchweed is an annual semiparasitic plant that was first identified as occurring in the United States in North Carolina and South Carolina in 1956. The infestation had been confined to parts of 37 contagious counties in the United States. A program to control and suppress witchweed has reduced losses from total crop failures in some cases to occasional minor damage. An eradication trial program has indicated that witchweed can be eradicated. A plan to complete the eradication of this pest from the United States was started in fiscal year 1977.

2. Witchweed is an annual chlorophyll-producing, seed-bearing, semiparasitic plant that may attack corn, sorghum, sugarcane, and more than 60 other species of the grass family that occur in this country. Witchweed plants are bright green and relatively small usually from 8 to 12 inches tall and are seldom over 18 inches. The species is characterized by bright red flowers, but some may be yellowish-red, yellow, or almost white. A single witchweed plant may produce as many as 500,000 microscopic seed.

Treatment of witchweed with "Goal" in corn will begin in May and continue until August. One or two applications of "Goal" will be made during this time. "Goal" gives effective residual preemergence control of witchweed in emerged corn. It gives as effective postemergence control of witchweed as the presently used herbicides. It provides excellent preemergence control of crabgrass and postemergence control of crabgrass that is less than 6 inches tall. This grassy weed acts as a host to witchweed late in the season after corn has matured.

3. Paraquat and 2,4-D are registered for witchweed control in corn. These two herbicides are effective when applied postemergence to witchweed but provide no residual control of the pest. 2,4-D treatments start about mid-June and continue at 2- to 3-week intervals until a killing frost which normally occurs about October 30. Paraquat is generally used during the latter part of the season after one or two applications of 2,4-D.

Because "Goal" has residual preemergence control of witchweed, the first application can be made in May or June, postemergence to the corn, before witchweed emerges. The second application, if necessary, would be put on in July or August. Two applications will control witchweed throughout the season. This continuous seasonal control is essential to eradication. During August, September, and October, corn lodges due to wind, insects, and maturity; also heavy rains prevent entry by the ground machines used for all witchweed control. With 2,4-D or paraquat, spraying must stop if fields are lodged or too wet. The eradication efforts of that and previous years are then lost as viable seed are produced to reinfest the area requiring the eradication cycle to be started again. An effective preemergence herbicide with residual control is imperative to eradication of witchweed in order to eliminate the presently necessary repeated applications and their inherent pitfalls previously mentioned. There is no herbicide available to substitute for the "Goal" use pattern. Herbicides are the only known means of controlling this parasitic weed.

4. Treatment of 2,4-D and paraquat are presently used to control this pest on corn. "Goal" will be used instead of 2,4-D in corn on the acres treated.

5. Approximately 15,000 pounds of "Goal" will be applied on 10,000 acres of corn. This will be applied in a contiguous 30-county area in North Carolina and South Carolina. Treatment will be a directed spray to the soil surface (pressure not to exceed 25 pounds per square inch) and target weed by ground equipment during May, June, July, and August. A maximum of two applications will be made where necessary. The need for the second application will be based upon survey. The rates for the first application will be three-fourths to 1 pound per acre and one-half to 1 pound per acre for the second application. The higher rates for both the first and second applications will be used where there is a heavy grass cover. The total amount used will not exceed 2 pounds maximum per acre in 1 year. Treatments will be applied by Plant Protection and Quarantine Programs (PPQ) personnel or certified commercial applicators under the supervision of qualified PPQ officers.

6. Economic losses and benefits based on past observations indicate that where heavy infestations of witchweed have been allowed to go uncontrolled, damage to corn has resulted in complete crop failure. Based upon previous research work, estimates of annual production loss of corn in the United States if witchweed were allowed to spread and not controlled

11

would approach 50 percent of the production. Therefore, corn could not continue to be produced on land infested with witchweed unless control measures were taken. Losses of corn in South Africa where witchweed is common is reported to be greater than that caused by all other diseases and insects combined. If allowed to spread throughout the United States, it is estimated that it would cost the farmers $675 million in annual control cost plus an estimated 10 percent loss in yield.

7. It is expected that no adverse effect will occur to man or the environment. Treatments will be made where, in the opinion of knowledgeable experts, treatment is required to attain PPQ objectives. Appropriate safety precautions will be followed. All pesticidal applications will be under the supervision of personnel who meet or exceed the requirements of "knowledgeable experts" as outlined in the Pesticide Enforcement Policy Statement. Monitoring will be conducted under the direction of PPQ personnel in accordance with plans outlined by the Environmental Evaluation Staff to determine the impact of the program on the environment, as well as to obtain residue data in food crops. Any food crop which is found to contain residues that are unacceptable to Environmental Protection Agency (EPA) standards shall not be marketed. Results of the monitoring program will be submitted to EPA.

12