

105001
SHAUGHNESSEY NO.

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REVIEW NO.

EEB BRANCH REVIEW

DATE: IN 8-24-81 OUT 10-23-81

FILE OR REG. NO. 241 - 238
PETITION OR EXP. PERMIT NO. 1F2540
DATE OF SUBMISSION 7-10-81
DATE RECEIVED BY HED 8-20-81
RD REQUESTED COMPLETION DATE 10-25-81
EEB ESTIMATED COMPLETION DATE
RD ACTION CODE/ TYPE OF REVIEW 335 / Amended - Food Use
TYPE PRODUCT(S): (I), D, H, F, N, R, S Insecticide
DATA ACCESSION NO(S). No F&W Data Submitted or Referenced
PRODUCT MANAGER NO. W. Miller (16)
PRODUCT NAME(S) Counter 15G
COMPANY NAME American Cyanamid Company
SUBMISSION PURPOSE Conditional Registration - Sorghum - Green Bugs

SHAUGHNESSEY NO.	CHEMICAL, & FORMULATION	% A.I.
105001	Terbufos (S-[[(1,1-dimethylethyl) thio]	
	methyl] o,o-diethyl phosphorodithioate)	15 %

100 Pesticide Label Information100.1 Pesticide Use

Add use on grain sorghum for control of greenbugs.

100.2 Formulation Information

Terbufos -- Counter® 15-G Soil insecticide-nematicide -- 15.% Granules

100.3 Application Methods, Directions, RatesDIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling. COUNTER 15-G should be applied with a granular pesticide applicator properly calibrated to assure accurate placement and proper dosage. See label for specific instructions.

Cover granules that may be exposed on the ends of the treated rows and turns and loading areas by deep disking immediately after treating fields.

<u>Crop</u>	<u>Pest Controlled</u>	<u>Rates Counter 15-G</u>	<u>Application</u>	<u>Remarks</u>
Sorghum Applied at planting	Greenbugs	<u>Banded</u> 8-16 oz. per 1,000 ft. of row for any row spacing (minimum 20-inch row spacing).	<u>Banded</u> Place granules in a 5-7 inch band directly behind the planter shoe in front of the press wheel.	Do not place granules in direct contact with seed.

100.4 Target Organism(s)

Control for greenbugs in grain sorghum.

100.5 Precautionary Labeling

DANGER! KEEP OUT OF REACH OF CHILDREN.

DANGER! May be fatal if swallowed, inhaled or adsorbed through the skin. Rapidly absorbed through the skin. Repeated inhalation or skin contact may, without symptoms, progressively increase susceptibility. Corrosive, causes eye damage. Harmful if swallowed, inhaled or to poisoning.

Do not get in eyes, on skin, on clothing.

Wear freshly laundered, long-sleeved work clothing daily. While transferring from package to equipment, wear a clean cap and gloves (rubber or cotton). If cotton gloves are used, they used be laundered or discarded after each day's use. Rubber gloves should be washed with soap and water after each use. Do not wear the same gloves for other work. Destroy and replace gloves frequently.

In case of contact, immediately remove contaminated clothing and wash skin thoroughly with soap and water. Launder clothing before reuse. Wash thoroughly with soap and water before eating or smoking. Bathe at the end of the work day and change outer clothing.

Do not breathe dust.

While emptying bags into equipment, pour downwind and allow as little free fall as possible. Do not pour at face level and do not allow dust to reach the breathing zone.

Do not contaminate food or feed products.

Sweep up and bury spillage, whether it occurs indoors or in the field. Once bag has been opened, use it completely or bury the remainder.

Make sure that the hoppers of equipment are emptied while still in the field. Keep all unprotected persons out of operating areas.

Keep out of reach of domestic animals.

Not for use or storage in or around the home.

Destroy empty bags and cartons by burning. Stay away from smoke and fumes.

ENVIRONMENTAL HAZARDS

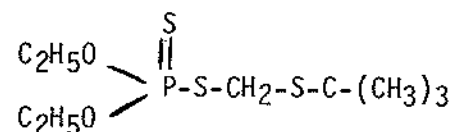
This product is toxic to fish, birds, and other wildlife. Treated granules exposed on soil surfaces may be hazardous to birds and other wildlife. Keep out of any body of water. Do not apply where runoff is likely to occur. Do not contaminate water by cleaning of equipment or disposal of wastes.

101 Chemical and Physical Properties (Former reviews and 1981 Farm Chemicals Handbook).

101.1 Chemical Name:

(S-[[[1,1-dimethylethyl) thio] methyl]-o,o-diethyl phosphorodithioate

101.2 Structural Formula



101.3 Common Name: Terbufos

101.4 Trade Name: Counter 15G

101.5 Molecular Weight: 288.43

101.5 Physical State

Technical

15G

Form and color:

clear, slightly brown liquid

fine, irregular

Odor:

mercaptan smell

gray granules

pH:

(772 granules =

Melting Point:

slightly below -15° C

0.084 grams)

Boiling Point:

Vapor Concentration:

101.6 Solubility

Soluble to 10-15 ppm in water at room temperature. Soluble in acetone, alcohols, aromatic hydrocarbons, and chlorinated hydrocarbons. Hydrolyzes under alkaline conditions.

102 Behavior in the Environment

(See reviews by Akerman (12/11/72 and Cook (5/30/75).

103 Toxicological Properties (No new data except mammal data found in the 1981 Farm Chemicals Handbook).

Test	Species	Material	LD/LC50	Validation Status
Oral LD50	Rat	86 % a.i.	1.5 mg/kg	
	Rat	86 % a.i.	1.7 mg/kg	
	Rat (Male)	Tech.	4.5 mg/kg	
	Rat (Female)	Tech.	9.0 mg/kg	
	Mouse (Male)	Tech.	3.5 mg/kg	
	Mouse (Female)	Tech.	9.2 mg/kg	
	Dog (Male)	Tech.	4.5 mg/kg	
	Dog (Female)	Tech.	6.3 mg/kg	
Dermal LD50	Rabbit	Tech.	1.1 mg/kg	
	Rabbit	15G (paste)	29-34 mg/kg	
	Rabbit	15G (dry)	900-1425 mg/kg	
Dietary Effects				
30 days	Rat	Tech.	Marked CHE depression at 2.0 ppm.	
30 days	Beagle Dog	Tech.	Depressed body weights at 0.25 ppm.	
31 days	Mice	Tech.	Significant body weight depression at 16.0 ppm	
8-Day Dietary LC50	Bobwhite	96.7 % a.i.	145 ppm	Core
	Bobwhite	86 %	140 (107-183) ppm	
	Pheasant	96.7 % a.i.	185 ppm	
	Mallard	86 % a.i.	160 (131-195) ppm	Invalid Core (food rejection)
	Mallard	86 % a.i.	520 (400-676) ppm	
Avian Reprod.	Bobwhite	? % a.i.	Sign. diff. at 2.0 and 20 ppm	
	Mallard	? % a.i.	No sign. diff.	
Simulated Field Tests	Pheasants	1.03 and 5.15 lb/A	No acute or chronic effects	
	Pheasants	Simulated spill	2 out 3 hens died within 12 hours of exposure	

Test	Species	Material	LD/LC50	Validation Status
Aquatic 96-Hour LC50	Bluegill	86 % a.i.	0.77 (0.71-0.83) ppb	Core
	Brown Trout	86 % a.i.	16 (8 -31) ppb	Core
	Bluegill	15 % a.i.	13.3 (10.08-17.56)ppb	Suppl./Core
	Rainbow Trout	15 % a.i.	68 (50.19-92.14)ppb	Suppl./Core
Aquatic Invertebrate 48-Hour EC50	<u>Daphnia magna</u>	15 % a.i.	13 (9.1 -18.6) ppb	Suppl./Core
Nontarget Insects	Carabid Beetles (5 species)	15 % G	100 % of all species died at recommended field rates (1 lb/A)	Scientifically Sound Study

104 Hazard Assessment

104.1 Discussion

Counter 15G is proposed for use in grain sorghum for control of greenbugs at the time of planting in a 5-7 inch band at a rate of 8-16 oz. per 1000 ft. of row for any row spacing (minimum of 20-inch row spacing), which is equivalent to 2.6-3.9 lb a.i./acre for 30-inch and 20-inch row spacings, respectively, as utilized in sorghum cultivation. These granules will be placed on the soil surface, according to use directions which indicate that the granules to be dropped onto the soil directly behind the planter shoe and in front of the press wheel, thereby the granules are pressed, but not incorporated, into the upper soil surface.

104.1.1 Likelihood of Exposure

A wide-range of wildlife will be potentially exposed to the granules pressed into the soil surface following terbufos treatment during planting of sorghum. During the sorghum planting season which is April and May, sorghum fields are utilized in various parts of the country for feeding, nesting, and/or brood-rearing by many wildlife species, such as rabbits, deer, songbirds, blackbirds, etc., as well as important avian game species like ring-necked pheasants, bobwhite quail, mourning doves, turkeys, and prairie chickens, according to Gusey and Maturgo (1973).

As a granular formulation, there would be no drift or widespread contamination of vegetation or other wildlife food items which may occur with sprays, but the granules themselves, if left uncovered as indicated in the proposed directions for use, may provide a hazardous source of toxicant for those species such as quail, pheasants, doves, meadowlarks, prairie chickens, etc. which feed in newly planted fields. These granules may be picked up as grit by seed-eating birds or may be attached to the mucous surfaces of earthworms or other soil organisms which may then be consumed by unsuspecting birds or mammals.

Terrestrial wildlife toxicity studies indicate that terbufos is highly toxic to birds and mammals, and considering the method of application and the exposed granules on the soil surface, terbufos use on sorghum poses a hazard to wildlife. Extrapolating for rat and mice LD50 values, insectivorous mammals need to consume only from 10 to 220 granules before exceeding levels which would kill 50 percent of the population. Calculation of the minimum number of granules which would be necessary to cause mammalian mortality was not possible, since the raw data were unavailable. The extent of the hazard to birds can not be estimated, since the avian acute oral LD50 data has never been submitted.

Terbufos residues in plants following translocation from the soil were indicated in crops residue studies on sorghum treated at 1 lb a.i./acre. Residues of 2.5 and 1.0 ppm terbufos were measured after 30 and 60 days, respectively. Assuming constant plant growth and residue degradation, the highest concentration would have been about 6.25 ppm (equivalent to 24.4 ppm at the maximum application rate of 3.9 lb. a.i./A). Since residues do not appear in sorghum above foliar application levels (125 ppm), terbufos does not appear to accumulate in sorghum above soil concentrations. These residue levels in sorghum approach the lowest test concentration which caused 10 percent mortality in bobwhite quail.

The highly toxic nature of Counter 15G to aquatic species is also of possible concern, since the granules may either be transported to water with sediments or as soluble residues in runoff. Terbufos is relatively soluble, 10,000-15,000 ppb solubility compared to aquatic LC50 values of 0.77-68 ppb. Aquatic ecosystem studies on 30-day old "aged" soil indicate that terbufos granules are hazardous to fish (100 percent mortality in bluegills at one-quarter of the maximum application rate proposed for use on sorghum).

104.1.2 Endangered Species

Earlier reviews (Corn - 6/30/79 and Broccoli, Cabbage, and Cauliflower - 1/2/81) have postponed an evaluation of the impact of terbufos usage on endangered species until missing wildlife data were submitted. Since the avian data was unavailable, no hazard evaluation on endangered species could be made. Due to the close proximity and association of sorghum to some endangered species, especially the Attwater's prairie chicken, an informal consultation was requested. In a telephone conversation with Jack Edmondson of the Office of Endangered Species (10/22/81) he indicated that the Attwater's prairie chicken made extensive use of sorghum fields from April through August for feeding and brood-rearing. He expressed concern for the safety of this species, especially the chicks, and felt that it was essential to have an avian acute oral LD50 study to evaluate the possible impact of sorghum use on that species. He also indicated that terbufos use on sorghum might impact on some endangered aquatic and insects species, but he did not elaborate on the species on concern due to other more pressing reviews. He felt that a complete formal consultation on all species should be requested when the avian toxicity data became available.

104.1.3 Adequacy of Toxicity Data

Adequate studies were available to fulfill most data requirements: Mallard and Bobwhite LC50's, Bluegill and Trout 96-hour LC50's and a formulation study on Daphnia magna (48-hour LC50).

104.1.4 Additional Data Required

Missing data essential to this review are the avian acute oral LD50 results, which are needed not only to evaluate hazard to game species, but also to endangered species such as the Attwater's prairie chicken. Earlier reviews indicated the need for a 48-hour aquatic invertebrate LC50 test on the technical material. For use on sorghum the existing Daphnia study using the 15 % granular formulation will be adequate for a hazard evaluation. The technical grade study may be requested to fulfill the data requirement for the manufacturing use product prior to reregistration.

107.0 Conclusions

EEB objects to the Conditional Registration of Counter® for use on sorghum as an extension of the registered use on corn. EEB objected to the corn registration pending the receipt of missing data, which has never been submitted. Consideration of corn usage on endangered species was postponed until additional requested data were submitted, because that missing data were essential to any hazard assessment. The corn registration was granted over EEB objections and a hazard assessment on endangered species was never made.

High utilization of newly planted sorghum fields by the endangered species, Attwater's prairie chicken, for feeding and brood-rearing makes the avian acute oral LD50 study necessary according to informal consultations with the Office of Endangered Species. OES has also indicated that the terbufos may adversely impact of endangered aquatic and insect species. OES requested that complete formal consultation be requested after the avian LD50 data are available.

Sorghum ranks as one of the larger crops with acreage exceeding 12.9 million acres. This acreage extends into or adjacent to the critical habitats of numerous endangered species. Comparison of the acreage planted in corn and sorghum by state and county indicate that *although* corn has more overall acreage, sorghum replaces corn in the more infertile areas. Table 1 indicates that sorghum equals or exceeds corn acreage in many counties (one-third of the sorghum-growing states) and that there is a general shift from corn to sorghum acreage along a northeast-southwest gradient, until sorghum about replaces corn in the drier southwest U.S.. The size of the sorghum acreage and the shift in the crops into large areas with many new species would appear to be more than a small incremental risk, especially when the original registration was granted over the objections of EEB and without consideration of its impact on endangered species.

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Table 1. Comparison of corn and sorghum acreage by state.

State	Corn	Sorghum	Comparison of Relative Acreage (sorghum versus corn) by Counties		
Alabama	507,060	19,948	less	--	in all counties
Arizona	34,175	22,016	higher	--	in several counties
Arkansas	22,623	175,505	higher	--	in all counties
California	292,668	107,185	higher	--	in about 50 percent
Colorado	722,540	338,423	higher	--	in about 50 percent
Florida	310,165	12,642	much less		
Georgia	1,527,218	36,493	much less		
Illinois	11,121,407	62,493	much less		
Indiana	6,111,779	11,144	much less		
Iowa	12,751,062	20,891	much less		
Kansas	1,578,299	3,674,328	much higher		
Kentucky	1,365,138	16,537	much less		
Louisiana	38,062	13,023	higher	--	in about 50 percent
Mississippi	121,068	17,574	similar	--	in largest sorghum counties
Missouri	2,287,335	822,834	higher	--	in about 50 percent
Nebraska	6,681,884	1,813,960	less	--	in most counties
New Mexico	68,940	271,019	much higher		
North Carolina	1,519,021	60,468	much less		
Oklahoma	56,736	519,391	much higher		
Pennsylvania	1,207,874	5,444	much less		
South Carolina	533,655	13,551	much less		
South Dakota	2,639,904	351,426	much less		
Tennessee	626,659	20,933	much less		
Texas	1,289,547	4,513,451	much less		
Virginia	631,004	10,703	much less		