



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

OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

August 10, 1987

MEMORANDUM

SUBJECT: Transmittal of the Qualitative Use Assessment for Terbufos

TO: Judy Heckman
Chief, Management Support Staff
Hazard Evaluation Division (TS-769-C)

FROM: William L. Gross, Jr. *Bill Gross*
Entomologist
Science Support Branch
Benefits and Use Division (TS-768-C)

THRU: Arnold L. Aspelin, Ph.D.
Chief, Science Support Branch
Benefits and Use Division (TS-768-C)

A handwritten signature, likely of Arnold L. Aspelin, consisting of stylized initials.

Attached are six copies of the Qualitative Use Assessment for Terbufos (105001) for your dissemination to the appropriate staff.

If I can be of further assistance, please let me know.

Attachment

cc: W. Miller (RD)
E. David Thomas (BUD)

REGISTRATION STANDARDS PHASE 1
QUALITATIVE USE ASSESSMENT
FOR INSECTICIDAL AND NEMATICIDAL USES OF
TERBUFOS 105001

Prepared by:
William L. Gross, Jr.

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

August 6, 1987

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I. MANUFACTURING USE PRODUCTS

LABEL NUMBER	ACTIVE INGREDIENT	% A.I.	FORMULATION	PRODUCT NAME	MANUFACTURER
241-241	Terbufos	85.0	Technical	Counter Technical Soil Insecticide	American Cyanamid Co.

105001-1

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II. MULTIPLE ACTIVE INGREDIENT FORMULATIONS

None.

III. END USE PRODUCTS

Sec. 3.	1
Intrastate	1 (LA)
24(c)	8 (IA, IL, MT, NE, NM, OR, WY)

Formulation types: Granular (all 15% G).

1. Section 3 Registrations: A new registration for use of terbufos for control of nematodes on field corn, pop corn, and sweet corn was granted on September 23, 1985. See attached labeling.

2. One Section 3 Registration exists for control of Chinch bug on field corn in the state of Louisiana. Registration granted March 3, 1986.

III. USE SUMMARY

Terbufos, (Counter®) is an organophosphate soil insecticide with both insecticidal and nematocidal properties. This chemical was first registered in 1974 for use in corn fields to control corn rootworm. This registration has been expanded to include other soil insects and nematodes that are pests of field, pop and sweet corn. Terbufos has also been registered for use in sugarbeet fields for control of the sugarbeet root maggot, wireworms, and for suppression of cutworms. It is also registered for use on sorghum for control of greenbug, corn leaf aphid, corn rootworm, white grubs and nematodes.

American Cyanamid markets terbufos as an 85 percent technical and 15 percent granular end-use product. There are presently 8 Special Local Need (SLNs), and no multiple active ingredient formulations registered.

COMMERCIAL/FINANCIAL INFORMATION IS NOT INCLUDED

Site Classification: Terrestrial Food Crop

Category: Agricultural Crops

Site: Field corn, Pop corn and Sweet corn

Pests: Corn rootworms, seedcorn beetle, seedcorn maggot, thrips, symphylans, wireworms, maize billbugs, southern corn billbug, white grubs, and the following nematode pests: Lesion nematode, spiral nematode, stunt nematode, sting nematode, stubby-root nematode, dagger nematode, lance nematode, and root-knot nematode. For suppression of cutworms and lesser cornstalk borer.

Label Summary: See EPA Index to Pesticide Chemicals.

Chemical Application: Terbufos is applied to field corn, pop corn, and sweet corn as a soil treatment to control insect pests.

Method of Application: Ground equipment is used to apply terbufos to field, pop, and sweet corn. Granular applicators attached to corn planter, or cultivators to apply granules in-furrow or as a 7 inch band; postemergence as a 7 inch band over the row, or at first cultivation.

Applicator: Terbufos is a restricted use pesticide which dictates that it be applied by a certified applicator or by persons under his/her direct supervision.

Timing and Number of Applications: Applications of terbufos are made at the time of planting in-furrow, or as a 7 inch band over the row in front of the press wheel and lightly incorporated; postemergence as a 7 inch band over the row of seedling corn plants and lightly incorporated into the soil, or at cultivation by applying granules to the base of plants or over the top of plants just ahead of cultivation shovels so as to cover granules with soil. Two applications per season permitted.

Pest Information: Only the three most important pests that attack field corn, pop corn and sweet corn in the U.S. will be addressed here. Northern corn rootworm, Diabrotica barberi, Western corn rootworm, Diabrotica vergifera, and Southern corn rootworm, Diabrotica undecimpunctata howardi.

The Northern and Western corn rootworms are very similar in their seasonal life cycles; however, there is increasing evidence that the northern species has adapted to crop rotational practices by a phenomenon commonly referred to as extended diapause (2 or more year egg life cycle). They are found throughout the major corn growing states. The larvae and adults of the northern and western species cause economic damage to corn by the larvae tunnelling and pruning the roots which causes decreased yields and lodging, and by the adults clipping silks which causes decreased pollination; consequently, fewer kernels per ear.

In late summer and early fall, adult females lay eggs in the soil of corn fields. These eggs remain unhatched throughout the winter. In late spring and early summer, newly hatched larvae appear and migrate through the soil and feed on developing corn roots should they be available. There is one generation per year in both species.

The Southern corn rootworm differs from its northern and western cousins in that it has a wide host range. It is commonly referred to as the spotted cucumber beetle, since it often attacks cucumbers. This insect overwinters as an adult under crop remnants, becomes active in the spring, and lay their eggs in the soil near host plants. When the eggs hatch, the tiny white larvae burrow into the roots, crowns, and stems and may even feed externally on the roots. Injury is especially serious to very young corn, and replanting is often necessary. This insect is only a serious pest of corn in the Southern and Southwestern U.S. There are two generations per year over most of its range.

Equipment: Corn planters are available in multiple row units. Granular pesticide applicators are attached to these planters which allow for either band or in-furrow applications at the time of planting. The granules are lightly incorporated into the soil to a maximum depth of 2 inches using press wheels, covering disks, drag chains or granular pesticide incorporators. Post emergence soil applications are made by attaching granular applicators to cultivators and applying the terbufos granules on each side of the row. The granules are placed just ahead of the cultivator shovels so that the granules are covered lightly with soil.

Cultural Practices:

Planting: For many years corn rows were commonly spaced 38 to 42 inches apart but with increased populatons the trend has been to narrow rows. The width of the row is limited to some degree by the equipment that is available, but 28 and 30 inch rows are used by a large number of producers, and row spacings of down to 20 inches are being used, in irrigated corn or corn grown for forage. Corn is usually planted to a depth of 2-3 inches. For very early plantings this depth may be reduced to between 1 and 1 1/2 inches or increased to between 3 and 4 inches when dry surface soil conditions prevail. NOTE: The use of terbufos requires a minimum of 30 inch row spacement.

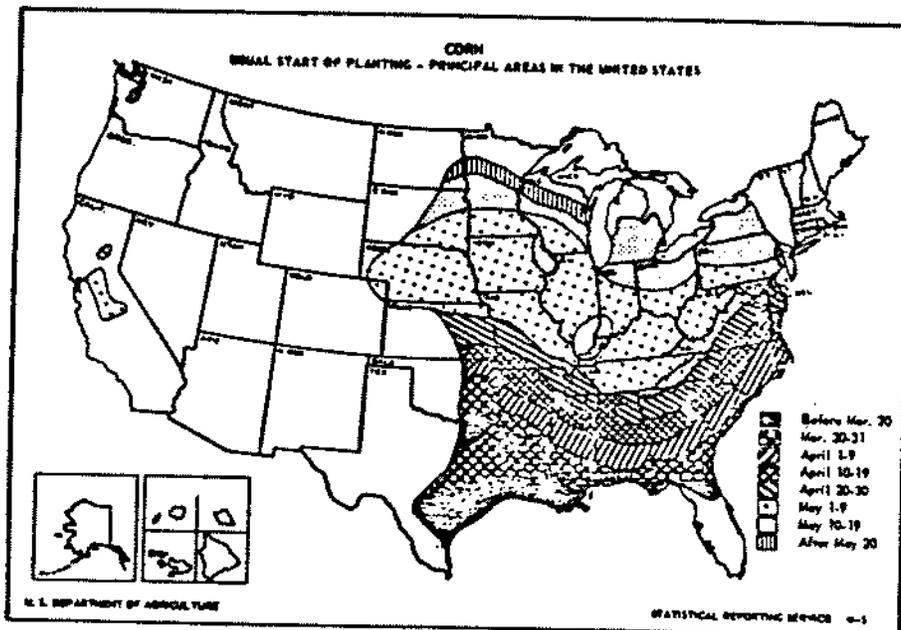
Planting Date: In Southern Texas corn planting begins around the first of February and the planting date is progressively later in more northern latitudes. Planting in the Corn Belt is at its peak around the middle of May (See figure 1).

Planting Rate: Plants per acre range from 12,000 to 25,000 per acre and populations of 30,000 plants per acre are not considered unusual on good soils in the Corn Belt.

Crop Rotations: In the Corn Belt, corn is normally rotated with soybeans, small grains or sorghum. Irrigated corn in the Western states is normally rotated with sugarbeets or potatoes, alfalfa, or small grains. Dryland Western states usually rotate corn with wheat, corn with barley or oats. The Southern states usually rotate corn with cotton, and grow a winter legume between these rotations to be turned under for green manure.

Additional Information: Terbufos is also used as a nematicide on a limited amount of the total corn acreage, primarily in the Southern States where nematode problems are generally more pronounced. Use in the Midwest is quite limited for this purpose. Nematicide treatments on corn are generally used only on fields with diagnosed nematode problems, or one with a history of nematode damage. The principle use in the South is to control the sting and stubby-root nematodes in sandy soils.

Figure 1



Usual dates when planting of corn is started in the principal areas of its culture in the United States.

Adapted from Crop Production By Delorit et al. 1984

Distribution of Northern Corn Rootworm
Diabrotica longicornis

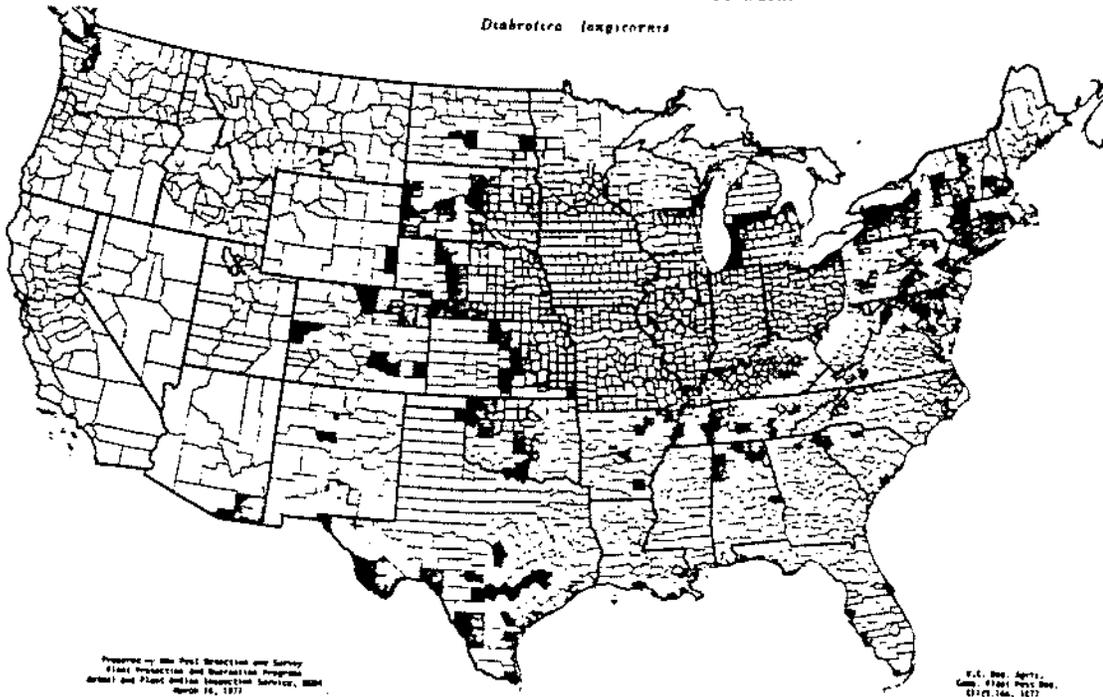


Figure 2.

Distribution of Western Corn Rootworm
Diabrotica virgifera

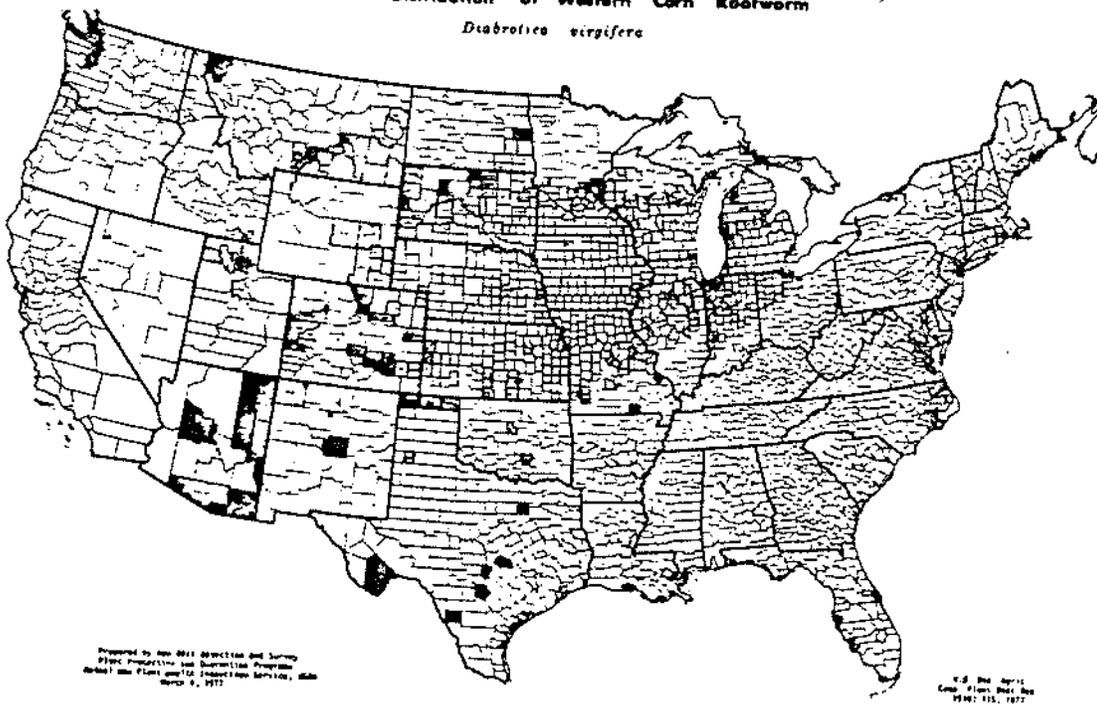


Figure 3.

Site: Grain Sorghum

Pests: Greenbug, corn leaf aphid, corn rootworm, wireworms, white grubs and nematodes.

Label Summary: See EPA Index to Pesticide Chemicals.

Chemical Application: Terbufos is applied to grain sorghum as a soil treatment to control insect pests, and nematodes.

Method of Application: Ground equipment is used to apply terbufos to grain sorghum. Equipment is designed to knife granules into the soil below the seed, or band granules in a 5 to 7 inch band over the row at planting.

Applicator: Terbufos is a restricted use pesticide which dictates that it be applied by a certified applicator or by persons under his/her direct supervision.

Timing and Number of Applications: Terbufos is applied to grain sorghum during early to late spring at the time of planting. Only 1 applications per year is permitted.

Pest Information: Only the three most important insect pest, Greenbug, Schizaphis graminum, corn leaf aphid, Rhopalosiphum maidis, Southern corn rootworm Diabrotica undecimpunctata howardi, and nematodes will be addressed here.

Prior to 1968, the greenbug was primarily a pest of small grains, particularly wheat. In that year, greenbugs successfully infested sorghum and caused extensive damage in the major sorghum producing areas of the U.S. This sorghum attacking greenbug was determined to be a variant of (Biotype A and B) which exclusively attacked small grains. This new variant was designated as Biotype C. While taxonomically the same as biotype A and B, it differed physiologically in that it could attack both small grains and sorghum. Since 1968, two additional biotypes (D and E) have developed. Biotype D is resistant to certain organophosphates (e.g., disulfoton and dimethoate) and is found in certain areas of Kansas, Texas, Nebraska and South Dakota. Biotype E appeared in 1980, and many sorghum varieties offering resistance to Biotype C were found to offer little or no protection against this new biotype. Biotype E has become the dominant biotype in most major sorghum producing areas.

Greenbugs are a major concern to growers because: (1) In addition to feeding on plant juices, they inject a toxin into the plant, which may cause death of the leaves or the entire plant if heavily infested; (2) large populations can build up in a short period of time due to the insect's tremendous reproductive potential; and (3) they are vectors of maize dwarf mosaic, a serious virus disease that can infect sorghum.

In the South, greenbugs remain active and produce living young throughout the year, resulting in more destruction in this area. In the North the insect hibernates in the egg stage. The greenbug is capable of reproducing at temperatures as low as 40°F, whereas its most important enemy parasite, Lysiphlebus testaceipes, which usually keeps it under control, can thrive only at temperatures above 65°F.

Corn leaf aphid: Feeding by the corn leaf aphid in the whorls of sorghum causes direct damage through loss of sap and may also hinder exertion of the head from the boot leaf. The corn leaf aphid is a vector of sugarcane mosaic virus that readily infects grain and forage sorghums. Males are rare and egg laying females have not been found. The aphid breeds continuously by parthenogenesis in warm climates; the winged forms migrating to temperate zones during summer months. In Texas, 39 to 50 generations per year have been recorded, while 9 generations were recorded in Illinois. Natural enemies such as lady beetles, syrphid flies, and Hymenopterous parasites such as Lysiphlebus testaceipes, frequently are effective in controlling corn leaf aphid.

Southern corn rootworm: The southern corn rootworm is the larval stage of the twelve spotted cucumber beetle. It is the most significant soil insect pest in sorghum and is of concern primarily in the Coastal Bend area of Texas. They burrow into the roots and crowns of young sorghum plants. Rootworm damage typically consists of reduced stands. Rarely are these insects damaging to plants more than 8 inches tall. Heavy infestations can completely destroy a stand, and replanting is often necessary. There are 2 generations per year over most of its range.

Nematodes: Several nematode species including root-knot nematodes, root lesion nematodes, stubby root nematodes and sting nematodes attack sorghum. These nematodes are especially destructive in the sorghum areas that have higher growing temperatures. The principle symptoms of nematode attack are plant stunting and restricted or abnormal root systems. In addition, nematode injury may allow fungal infections. These effects causes plant stress and reduced yield.

Equipment: Row planted sorghum is done with corn, bean or sugarbeet planters, and planters especially designed for sorghum. Granular pesticide applicators fitted with 7 inch spreaders for applying 5 to 7 inch bands of terbufos over the row, or a modified lister with discs for knifing granules into the soil 1 to 4 inches directly below the seed and up to 5 inches to the side of the seed.

Cultural Practices:

Planting: Sorghum does not have great penetrating ability, therefore, it should not be covered too deeply regardless of

planting method. Grain sorghum is usually planted using 20 to 40 inch row spacings. Narrow rows of sorghum under average or better-than-average conditions provide a more effective feeding area around each plant (plants are not so close together in the row), and a better canopy that lowers soil temperature and decreases evaporation.

Planting Date: Most grain sorghum from North Texas to South Dakota is planted in late May and early June; however, planting in South Texas, particularly the Coastal Bend area, begins in mid February and proceeds northward at successively later stages to the High Plains around June 1. Late plantings of early maturing varieties may be made as late as July in the Southern Plains. Planting in the South ranges from May to early July.

Planting Rate: Most dryland grain sorghum in the Great Plains is planted at rates to produce stands of between 15,000 and 50,000 plants per acre, with 20,000 to 35,000 being the most common. The lower rates are used in the western areas of low rainfall; the higher rates on the fringes of the Corn Belt. In the Corn Belt, the South and the Texas Gulf Coast, rates of 50,000 plants per acre are desirable. Under irrigation, rates of 100,000 to 200,000 plants per acre are necessary for maximum yields.

Crop Rotations: Depending on the geographic area of the U.S., climatic conditions, and other factors, sorghum is grown continuously in combination with other crops. However, since most sorghum is grown in the Great Plains and Southwest, sorghum is usually associated with wheat and cotton in cropping sequences. A common rotation in the winter wheat states is sorghum-fallow-wheat; while in the cotton producing states it is sorghum-soybeans-cotton. In the Corn Belt and some areas of the South, sorghum is substituted for corn in the rotation.

Site: Sugarbeets

Pests: Sugarbeet root maggot, wireworms and cutworms

Label Summary: See EPA Index to Pesticide Chemicals

Chemical Application: Terbufos is applied to sugarbeets as a soil treatment to control insect pests.

Method of Application: Ground equipment is used to apply terbufos to sugarbeets. Equipment used is a granular applicator designed to deliver granules in a 5 to 7 inch band over the row at planting or postemergence.

Applicator: Terbufos is a restricted use pesticide which dictates that it be applied by a certified applicator or by persons under his/her direct supervision.

Timing and Number of Applications: Applications of terbufos are made to sugarbeets during early spring at-planting, or post emergence during late spring and early summer. Only one application per season is permitted.

Pest Information: Only the most important insect pest of sugarbeets will be discussed here; the sugarbeet root maggot, Tetanops, myopaeformis. This insect overwinters as a mature larvae in the soil of beet fields. In spring the larvae move up to within one to two inches of the soil surface and pupate. Adult flies emerge from mid to late spring and deposit eggs around the base of young sugarbeet plants. Eggs hatch in about a week and the larvae commence feeding on the underground portion of developing sugarbeet plants. There are from 1 to 2 generations produced each season. The presence of wilted plants is often an indication that a field is infested. Young plants are often killed which results in fields with reduced plant stand. Older plants may survive a root maggot infestation but the plants are often severely dwarfed and stunted. Sugarbeet root maggot infestations result in reduced yields. The sugarbeet root maggot is considered a serious annual pest in areas of North Dakota, Wyoming, Idaho, and Colorado. In these areas preventive treatment for this pest is justified. It is estimated that 38 percent of the U.S. acreage is subject to sugarbeet root maggot damage which results in approximately 2 percent yield loss per year.

Equipment: Sugarbeet planters, and granular pesticide applicators fitted with 7 inch spreaders are used to apply 5 to 7 inch bands over the row. Either power or mechanical incorporation may be used to lightly incorporate the granules into the soil.

Cultural Practices:

Planting: Row spacement for sugarbeets range from, 18 to 22 inches apart or in 34 cm. double rows spaced at one meter between centers. Special 4 to 12 row planters are used to seed fields. NOTE: The use of terbufos requires a minimum of 20 inch row spacement.

Planting Date: In North Dakota, Wyoming, Idaho, and Colorado, the planting of sugarbeets range from March through the end of May.

Planting Rate: The desired stand is from 2,100 to 3,600 plants per acre. Unprocessed monogerm or processed multigerm seed is planted at a rate of 5 to 8 lbs per acre or monogerm, polished to remove some of the cork, is usually planted at a rate of 1.5 to 4 lbs per acre. The final desired spacing within a row is 8 to 12 inches apart.

Crop Rotations: Sugarbeets are grown almost exclusively in rotations that involve legumes (alfalfa, red clover, and sweet clover), small grains, and frequently, potatoes, corn or beans.

REFERENCES

- Alabama Insect Control Guide (1980). Alabama Cooperative Extension Service, Auburn University.
- Bergman, M. K. and C. R. Edwards (1986). Managing Corn Rootworm-1986. Cooperative Extension Service, Purdue University.
- Capizzi, J. G. Fisher, C. Baird, R. Stoltz, A. Antonelli, and D. Mayer (1987). Pacific Northwest Insect Control Handbook. Extension Services of Oregon State Univ., Washington State Univ., and the University of Idaho.
- Crawford, J. C. (1978). Corn Nematode Control. Cooperative Extension Service, University of Georgia.
- Delorit, R. J., L. J. Greub, and H. L. Ahlgren (1984). Crop Production, 5th Edition, Prentice-Hall, Inc., 768 pp.
- Davidson, R. H., and N. F. Lyon (1979). Insect Pests of Farm, Garden and Orchard, Wiley and Sons, N.Y., 596pp.
- Kantack, B. H. (1987). South Dakota Insecticide Recommendations Handbook. Cooperative Extension Service, South Dakota State Univ.
- Keith, D. L., F. P. Baxendale, L. L. Peters, J. F. Witkowski, J. B. Campbell, A. F. Hagen, and S. D. Danielson, (1987). Field Crop Insect Control Guide for Nebraska - Corn and Sorghum. Univ. of Nebraska Coop. Extension Service.
- Martin, J. H. , W. H. Leonard and D. L. Stamp (1976). Principles of Field Crop Production. McMillan Inc., New York, 1118 pp.
- McBride, D. K. and D. D. Koop (1987). North Dakota Insect Control Guide. North Dakota State University Coop. Extension Service.
- Munson, G. (1987). Insect Control Recommendations for Missouri. Univ. of Missouri Extension Division.
- Nyvall, R. F. (1978). Fungicides and Nematicides for Agronomic Corps in Iowa. University of Iowa.
- Harris, E. D. (1987). The 1987 Georgia Pest Control Handbook. Cooperative Extension Service, University of Georgia.
- Johnson, D. R. and B. F. Jones (1987). 1987 Insecticide Recommendations for Arkansas. Cooperative Extension Service, University of Arkansas.
- Oklahoma (1987). Extension Agents Handbook. Cooperative Extension Service, Oklahoma State University.

Patrick, C. R. and J. F. Bradley (1982). Lake County Grain Sorghum Soil Insecticide Demonstrations. Extension Service, University of Tennessee

Peairs, F. B., W. M. Brown, H. F. Schwartz, and P. Westra (1987). 1987 Colorado Pesticide Guide - Field Crops. Colorado State University Cooperative Extension Service.

Robson, M. (1985). Pesticides for New Jersey 1985. Department of Entomology, State University of New Jersey, Rutgers.

Spackman, E. and C. C. Burkhardt (1987). Control of Field Crop Insects. University of Wyoming Agricultural Extension Service.

241-238

COUNTER

SYSTEMIC INSECTICIDE NEMATOCIDE

Insecticide
Nematicide

Sept 23, 1985

RESTRICTED USE PESTICIDE
Due to acute oral and dermal toxicity.

For retail sale to, and use only by Certified Applicators or persons under the direct supervision of a Certified Applicator, and only for those covered by the Certified Applicator's certification.

American Cyanamid Company endorses Certification to promote the responsible use of pesticides to insure the protection of man and the environment.

FOR USE IN FIELD CORN, POPCORN, SWEET CORN, SUGAR BEETS, AND GRAIN SORGHUM

Active Ingredient: terbufos (S-[[[1,1-dimethylethyl]thio]methyl] 0,0-diethyl phosphorodithioate) ..	15.0%
Inert Ingredients	85.0%
EPA Reg. No. 241-238	Total 100.0%

KEEP OUT OF REACH OF CHILDREN
DANGER



(PELIGRO! PRECAUCION AL USUARIO: Si usted no lee ingles, no use este producto hasta que la etiqueta le haya sido explicada ampliamente.

CALL A PHYSICIAN AT ONCE IN ALL CASES OF SUSPECTED POISONING.

FIRST AID

If swallowed, drink one or two glasses of water and induce vomiting by touching back of throat with finger. Do not induce vomiting or give anything by mouth to an unconscious person. Avoid alcohol. Get medical attention.

If inhaled, remove to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Get medical attention.

If on skin, wash thoroughly with soap and water. Remove contaminated clothing and shoes. Wash clothing and decontaminate shoes before reuse.

If in eyes, immediately flush eyes with plenty of water. Get medical attention.

Repeated inhalation or skin contact may, without symptoms, progressively increase susceptibility to poisoning. Antidote: Atropine is an antidote.

NOTE TO PHYSICIANS: Warning symptoms include weakness, headache, tightness in chest, blurred vision, nonreactive pinpoint pupils, salivation, nausea, vomiting, diarrhea, and abdominal cramps. Give atropine intramuscularly or intravenously, depending on severity of poisoning. 2 to 4 milligrams every 10 minutes until fully atropinized as shown by dilated pupils, dry flushed skin and tachycardia. Twenty to thirty milligrams, or more, may be required during the first 24 hours. Never give opiates or phenothiazine tranquilizers. Clear chest by postural drainage. Artificial respiration or oxygen administration may be necessary. Observe patient continuously for at least 48 hours. Allow no further exposure to any cholinesterase inhibitor until cholinesterase regeneration has taken place as determined by blood tests.

Pralidoxime chloride (2-PAM; PROTOPAM chloride) may be effective as an adjunct to atropine. Use according to label directions.

See Back Panel for Additional Precautionary Statements.



SOLD BY
American Cyanamid Company
Agricultural Division
Crop Protection Chemicals Department
Wayne, NJ 07470 © 1985

Net Weight 50 lbs.
22.68 kg.

24696-07
D46

© Trademark of American Cyanamid Company

Lot No: See bag seal

Made and Printed in U.S.A. 7/85

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COUNTER

SYSTEMIC INSECTICIDE - NEMATICIDE

PRECAUTIONARY STATEMENTS HAZARDS TO HUMANS AND DOMESTIC ANIMALS DANGER!

Fatal if inhaled, inhaled, or absorbed through the skin. Do not breathe dust. Do not get in eyes, on skin, or on clothing.

Wear heavily laundered, long-sleeved work clothing daily. While transferring from container to equipment, wear a clean coat, gloves (rubber or cotton) and goggles. If cotton gloves are used, they must be laundered 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 and decontaminate shoes before reuse. Wash thoroughly with soap and water before eating or smoking. Bathe to the end of the work day and change clothing.

Do Not Breathe Dust

While emptying bags into equipment, pour downward 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

Once a bag has been opened, use it completely. Make sure the hoppers are emptied while still in the bag. Refer to STORAGE AND DISPOSAL statement for further instructions.

Keep All Unprotected Persons Out of Operating Areas.

Do not apply this product in such a manner as to directly or through drift expose workers or other persons.

Keep Out of Reach of Domestic Animals.

Not For Use or Storage in or Around the Home.

RE-ENTRY STATEMENT

Do not enter treated areas without protective clothing until treatments have been completed.

Because certain states may require more restrictive re-entry intervals for various crops treated with this product, contact your State Department of Agriculture for further information.

Written or oral warnings must be given to workers who are expected to be in a treated area or in an area about to be treated with this product. Written warnings are given, warnings that be given in a language customarily understood by workers. Oral warnings must be given if there is reason to believe that written warnings cannot be understood by workers. Written warnings must include the following information: DANGER. Area treated with COUNTER on (date of application). Do not enter without protective clothing.

ENVIRONMENTAL HAZARDS

This product is toxic to fish, birds and other wildlife. Treated granules exposed on soil surface may be hazardous to water and other wildlife. Do not apply directly to water or wetlands. Runoff from treated areas may be hazardous to aquatic organisms in neighboring areas. Do not contaminate water by cleaning of equipment or disposal of wastes. Cover or incorporate into soil granules that are spilled.

IN CASE OF AN EMERGENCY ENDANGERING LIFE OR PROPERTY INVOLVING THIS PRODUCT, CALL COLLECT, DAY OR NIGHT, AREA CODE 201-435-3100.

STORAGE AND DISPOSAL

Storage: Store pesticide product in a secure locked area where children, unauthorized persons and animals cannot enter. Do not store in the same area with food or feed. Do not store opened bags.

Prohibitions: Do not contaminate water, food or feed by storage or disposal. Open dumping is prohibited.

Pesticide Disposal: Pesticides which are acutely hazardous: Improper disposal of acute pesticides, solary mixtures, or mixtures is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your state pesticide or Environmental Control Agency, or the National Waste representative at the nearest EPA Regional Office for guidance.

Container Disposal: Completely empty bag into application equipment. Then dispose of empty bag in a sanitary landfill or by incineration, or if allowed by state and local authorities, by burning, if burned, stay out of smoke.

General: Contact federal, state, or local disposal authorities for approved alternative procedures such as incineration.

DISCLAIMER

The label instructions for the use of this product reflect the opinion of experts based on field tests and tests. The decisions are believed to be reliable and should be followed carefully. However, it is impossible to guarantee or make warranty associated with use of this product. Crop injury, maldevelopment, or other unintended consequences may result because of such factors as weather conditions, presence of other materials, or the use of application of the product contrary to label instructions, all of which are beyond the control of American Cyanamid Company. All such risks shall be assumed by the user.

American Cyanamid Company warrants only that the material contained herein conforms to the chemical description on the label and is reasonably fit for the use therein described when used in accordance with the directions for use, subject to the risks referred to above.

Any damages arising from a breach of the warranty shall be limited to direct damages and shall not include consequential or commercial damages such as loss of profits or value of any other special or indirect damages.

American Cyanamid Company makes no other express or implied warranty, including any other express or implied warranty of FITNESS or MERCHANTABILITY.

Use Rates are Pounds per Acre* (Based on various row spacings and application rates)

Application Rates (Oz./1,000 Ft. of Row)

Row Width (inches)	4 oz.	4.5 oz.	5 oz.	5.5 oz.	6 oz.	6.5 oz.	7 oz.	7.5 oz.	8 oz.
40"	3.3	4.9	6.5	8.2	9.8	11.4	13.1	14.7	16.4
36"	3.4	5.2	6.9	8.6	10.3	12.0	13.7	15.4	17.1
32"	3.6	5.4	7.2	9.0	10.8	12.6	14.4	16.2	18.0
28"	3.9	5.8	7.7	9.7	11.6	13.5	15.4	17.3	19.2
24"	4.1	6.1	8.2	10.2	12.2	14.2	16.2	18.2	20.2
20"	4.4	6.5	8.7	10.8	12.9	15.0	17.1	19.2	21.3
16"	4.7	7.1	9.5	11.8	14.2	16.6	18.9	21.3	23.6
12"	5.0	7.6	10.2	12.7	15.3	17.9	20.4	22.9	25.4
8"	5.4	8.2	10.9	13.6	16.3	19.0	21.7	24.4	27.1
4"	5.9	8.9	11.9	14.9	17.9	21.0	24.0	27.0	30.0
2"	6.5	9.6	12.1	15.2	18.4	21.6	24.8	28.0	31.2

*See directions for specific use rates on each crop.

CALIBRATION INFORMATION

FIRST READ THE LABEL.

It is important that applicator equipment be properly set to deliver the labeled rate. This chart will help determine the desired rate of application.

When label is 8 ounces per 1,000 feet of row, use these suggested starting gauge settings, regardless of row spacing:

PLANTING SPEED

APPLICATOR	3 mph	5 mph	7 mph
Gandy	16	24	28
New Noble (Square Hole)	6	12	16
Old Noble (Round Hole)	11	21	25
International Harvester	1/3 0	2 1/5	2/7 5
New International Harvester	1/3 0	2 1/5	3/2 0
New John Deere (Plastic Furnish)	15	19	25
Newest John Deere (Aluminum Furnish)	11	17	19
Old John Deere	1/28	2 0	2/15
Buffalo (Gauged)		9	12
Buffalo (Fluted-rod Feed)		9	12

All speeds - 1 1/4 revolutions of horizontal nut
All Spools - Gauge 1
Sorghum 18 20, pease 3 3
Refer to Harrow settings

NOTE: These settings should be used as starting points only. Continually check the amount of COUNTER used against a known length of row or acreage and make further adjustments accordingly. Also, check carefully occasionally to make sure equipment wear, changing moisture conditions, etc., have not caused

DIRECTIONS FOR USE

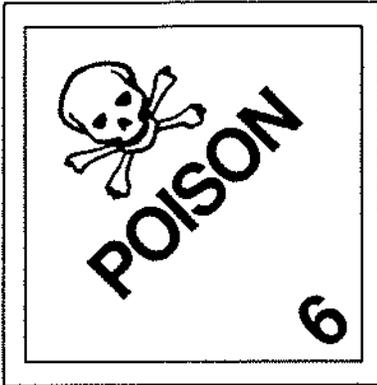
It is a violation of Federal Law to use this product in a manner inconsistent with its labeling. This label must be in the possession of the user at the time of pesticide application.

BEFORE USING, READ PRECAUTIONARY STATEMENTS.

COUNTER should be applied with a granular broadcast applicator properly calibrated to assure accurate placement and proper coverage. Cover granules that may be applied on the ends of the treated rows and turns and loading areas by deep tilling immediately after seeding time.

Crops	Pests Controlled	Rates of COUNTER	Application	Remarks
FIELD CORN, POPCORN, AND SWEET CORN At Planting	Com rootworms Wireworms White grubs Seedcorn maggots Seedcorn weevils Corn flea beetles Maize drillbugs Southern corn billbugs Triox Symphylan Nematodes Larvae Root rot Spiral Skirt Slings Starchy root Digger	Banded or In-Furrow 4 oz. per 1,000 ft. of row for any row spacing (minimum 30-inch row spacing)	Banded Place granules in a 7-inch band over the row at front of or behind the pressurizer and lighty incorporator. In-Furrow Place granules directly in the seed furrow behind the planter shoe	For use on conventional and conservation tillage corn. In situations where crop damage or weeds can prevent proper placement of granules, in-furrow applications are recommended. In-furrow applications reduce the potential for noticeable runoff resulting from excessive rain. Under dry soil conditions or heavy insecticide, it may be necessary to apply an insecticide rescue treatment with another registered insecticide after corn emergence to control surviving culprits larvae. If especially heavy infestations are suspected, banded applications of up to 1.6 oz. per 1,000 ft. of row may be used.
Feet-emergence incorporated (Same as crops above)	Maize drillbug Southern corn billbug	Banded 1.2-1.6 oz. per 1,000 ft. of row for any row spacing (minimum 30-inch row spacing)	Apply in a 7-inch band over the row of seedling corn plants and lightly incorporate into the soil when billbugs or damage are observed, usually in the 1-4 leaf stage of growth. Use cultivators or other suitable equipment to lightly incorporate granules into soil.	Only one post-emergence incorporation or one cultivation with COUNTER may be used in addition to treatment at planting time. Do not treat if more than 8 oz. per 1,000 ft. of row were applied at planting. Do not graze or cut for forage within 30 days of treatment. Consult your state or provincial extension service or certified pest management specialist for proper rate and timing of application.
At Cultivation (Same as crops above)	Com rootworms	8 oz. per 1,000 ft. of row for any row spacing (minimum 30-inch row spacing)	Apply granules to base of plants or over the top of plants just ahead of cultivation shovels or as to cover granules with soil.	Only one post-emergence incorporation or one cultivation with COUNTER may be used in addition to treatment at planting time. Do not graze or cut for forage within 30 days of treatment.
SUGAR BEETS At Planting	Sugar beet root maggots Wireworms	Banded 4-6 oz. per 1,000 ft. of row for any row spacing (minimum 20-inch row spacing)	Banded Apply in a 5 to 7-inch band over the row and apply incorporate with the soil.	At Planting Do not place granules in direct contact with the seed as crop injury may occur. Power incorporation may be used if 1 inch or more of topsoil is present.
SUGAR BEETS Post-emergence	Sugar beet root maggots	Banded 4 oz. per 1,000 ft. of row for any row spacing (minimum 20-inch row spacing)	Banded Apply in the 7 to 9 inch band behind the planter shoe in front of the pressurizer.	Post-emergence Apply in the 7 to 9 inch band behind the planter shoe in front of the pressurizer with the soil.
SUGAR BEETS At Planting	Suppression of Culprits	Banded 4 oz. per 1,000 ft. of row for any row spacing (minimum 20-inch row spacing)	Banded Apply in a 5 to 7-inch band directly behind the planter shoe in front of the pressurizer.	Post-emergence Apply in the 7 to 9 inch band behind the planter shoe in front of the pressurizer with the soil.
GRAIN SORGHUM At Seeding	Greenbug Corn leaf aphid	Knifed-in 8-14 oz. per 1,000 ft. of row for any row spacing (minimum 20-inch row spacing) or no more than 25 lbs. per acre	Knifed-in One granule 1-4 inches directly behind the seed OR 1-4 inches behind the seed and up to 5 inches to the side of the seed	Do not place granules in direct contact with the seed as crop injury may occur.
GRAIN SORGHUM At Planting	Greenbug Corn leaf aphid	Knifed-in 8-14 oz. per 1,000 ft. of row for any row spacing (minimum 20-inch row spacing) or no more than 25 lbs. per acre	Knifed-in One granule 1-4 inches directly behind the seed OR 1-4 inches behind the seed and up to 5 inches to the side of the seed	Do not use banded applications or aerial control in New Mexico, West Texas and the Panhandle in Oklahoma.
GRAIN SORGHUM At Planting	Com rootworms Wireworms White grubs Nematodes	Banded 5-14 oz. per 1,000 ft. of row for any row spacing (minimum 20-inch row spacing)	Banded Place granules in a 5-1 inch band directly behind the planter shoe in front of the pressurizer.	Only one application per year may be used.

DOT-44D



DOT-E9277
ORGANIC PHOSPHATE
COMPOUND MIXTURE, DRY

NA 2783

GOUNTER
SYSTEMIC INSECTICIDE - NEMATOCIDE

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COUNTER[®]
systemic insecticide-nematicide

Supplemental Labeling

(EPA Reg. No. 241-238)

DIRECTIONS FOR USE

BEFORE USING, READ PRECAUTIONARY
STATEMENTS ON BAG

ACCEPTED
JUL 28 1986
Under Fungicide, Insecticide, and Nematicide, as amended for the products registered under EPA Reg. No. 241-238

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling. COUNTER should be applied with a granular pesticide applicator properly calibrated to assure 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 discing immediately after treating fields.

Crop	Pest Controlled	Rates of COUNTER	Application	Remarks
Sugar Beets At Planting	Sugar Beet ⁽¹⁾ Root Maggots Wireworms ⁽¹⁾ White grubs ⁽¹⁾	<u>BANDED OR MODIFIED IN-FURROW</u> 4-8 oz. per 1000 ft. of row for any row spacing (minimum 20-inch row spacing)	<u>BANDED</u> Apply in a 5 to 7-inch band over the row and lightly incorporate into the soil <u>MODIFIED IN-FURROW</u> Apply in-furrow at planting time 2-3 inches behind the seed drop zone after some soil has covered the seed	Do not place granules in direct contact with the seed as crop injury may occur. <u>Banded Applications:</u> Power incorporation may be used. Do not incorporate deeper than 2 inches (1) If especially heavy infestations are expected use the 8 oz. rate ONLY ONE APPLICATION PER YEAR MAY BE USED.

THIS LABEL SHOULD BE IN THE POSSESSION OF THE
USER AT THE TIME OF PESTICIDE APPLICATION.

 **CYANAMID**
Agricultural Division C1284
Crop Protection Chemicals Department
Wayne, New Jersey 07470

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COUNTER[®]
systemic insecticide-nematicide

Supplemental Labeling

(EPA Reg. No. 241-238)

DIRECTIONS FOR USE

BEFORE USING, READ PRECAUTIONARY STATEMENTS ON BAG

ACCEPTED
JUL 28 1986
This is a Federal Insecticide, Fungicide and Rodenticide Act. Use restricted to the pesticide registered under EPA Reg. No. 241-238

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling. COUNTER should be applied with a granular pesticide applicator properly calibrated to assure 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 discing immediately after treating fields.

Crop	Pest Controlled	Rates of COUNTER	Application	Remarks
Grain Sorghum At Planting	Greenbugs Corn Leaf Aphids	KNIFED-IN 8-16 oz. per 1000 ft. of row for any row spacing (Minimum 20-inch row spacing) or no more than 26 lbs. per acre.	KNIFED-IN Drill granules 1-4 inches directly below the seed OR 1-4 inches below the seed and up to 5 inches to the side of the seed.	Do not place granules in direct contact with seed as crop injury may occur.
	Corn Leaf Aphids Corn Root-worms Greenbugs Wireworms White grubs Nematodes	BANDED 8-16 oz. per 1000 ft. of row for any row spacing (Minimum 20-inch row spacing).	BANDED Place granules in a 5-7 inch band over the row, in front of or behind the presswheel and lightly incorporate.	Do not use banded application for Aphid control in New Mexico, West Texas, and the Panhandle of Oklahoma.
	Greenbugs FOR EARLY SEASON CONTROL	MODIFIED IN-FURROW 6 oz. per 1000 ft. of row for any row spacing (Minimum 20-inch row spacing).	MODIFIED IN-FURROW Apply In-Furrow, 2-3 inches behind the seed drop zone after some soil has covered the seed.	Only one application per year may be used.

THIS LABEL SHOULD BE IN THE POSSESSION OF THE USER AT THE TIME OF PESTICIDE APPLICATION.

 **CYANAMID**
Agricultural Division
Crop Protection Chemicals Department
Wayne, New Jersey 07470

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COUNTER
systemic insecticide-nematicide

Supplemental Labeling

E.P.A Reg. No. 241-238

ACCEPTED

FOR DISTRIBUTION AND USE ONLY
WITHIN THE STATE OF LOUISIANA

DIRECTIONS FOR USE

241-238

BEFORE USING, READ PRECAUTIONARY
STATEMENTS ON BAG

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling. COUNTER should be applied with a granular pesticide applicator properly calibrated to assure 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.

Crop	Pests Controlled	Rate of COUNTER	Application	Remarks
Field corn At Planting	Chinch bug	In-furrow 8 oz/1,000 ft. of row for any row spacing (minimum 30 inch row spacing)	In-furrow Apply in-furrow at planting time. Place granules directly in the seed fur row behind the planter shoe.	For early season control of light to moderate infestations.

THE LABEL SHOULD BE IN THE POSSESSION OF THE
USER AT THE TIME OF PESTICIDE APPLICATION

 **CYANAMID**
American Cyanamid Company
Agricultural Division
Crop Protection Chemicals Department
Wayne, NJ 07090 1985

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