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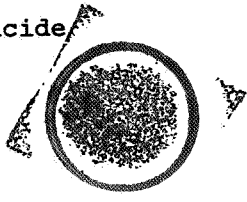
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Atrazine / Review #32 / 10.7.80 / 16 pages #63

DATE: October 7, 1980

SUBJECT: EPA File Symbol: 2749-U1L
Atrazine 90 Water Dispersible Granule Herbicide

FROM: Sherell A. Sterling *sdh 10-20-80 E 11/3/80*
FHB/TSS



Releasable

TO: Robert Taylor
Product Manager (25)

Applicant: Aceto Agricultural Chemicals Corp.
126-02 Northern Blvd.
Flushing, NY 11368

Active Ingredients:

Atrazine	85.5%
Related Compounds	4.5%
Inert Ingredients	10.0%

Background: Acute Oral, Acute Dermal, Eye and Skin Irritation studies were submitted on this product. The studies were conducted by Hill Top Research of Miami, Ohio. These studies are not accessioned. The method of support is "alternate."

Recommendations:

1. The Acute Oral study is considered acceptable and adequate for conditional registration purposes.
2. The Acute Dermal study is considered adequate and acceptable for conditional registration purposes. Please note that for solids, substances must be slightly moistened with physiological saline.
3. The Eye Irritation study is considered Core Supplementary Data and, therefore, is not adequate to support conditional registration. Please note that the correct dosage for this study is 100 mg when the substance is a solid.
4. The Primary Dermal Irritation test is adequate and acceptable for conditional registration purposes.
5. An Acute Inhalation test was not submitted for this product. This study, or a statement which shows that this study is not required must be submitted for this product. Please refer to Sec. 163.81-3(a) of the "Proposed Guidelines for Human Hazard Evaluation" for further information regarding the Acute Inhalation study requirement. We note that due to mechanical action, granular formulations often form "fines" within the container which may present an inhalation exposure.

6. FHB/TSS objects to the conditional registration of this product under the "alternate method of support" until acceptable Eye Irritation and Acute Inhalation Data are submitted.
7. Labeling recommendations are withheld until the additional data are submitted.

Review:

1. Acute Oral Administration - Rats;
Hill Top Ref. #80-636-21; July 15, 1980

Procedure: Six groups of 5M (208-252g) and 5F (161-197g) Sprague-Dawley rats received an oral administration of "Atrazine 90 WDG." The test substance is administered as a 50% wt/vol. solution in distilled water. Dosage levels were 0.464, 1.00, 2.15, 4.64, 5.0 and 10.0 g/kg. Animals were observed for 14 days post-administration. All animals were subjected to necropsies at death or termination of study.

Results: At 5.0 g/kg, all animals died; symptoms were equivalent to those at other dosage levels. Deaths reported were: 0/5M, 0/5F at 0.464 g/kg; 0/5M, 0/5F at 1.0 g/kg; 2/5M, 2/5F at 2.15 g/kg; 5/5M, 5/5F at 4.64 g/kg; 5/5M, 5/5F at 10 g/kg. The LD₅₀ for M was 2.33 g/kg with a 95% confidence limit of 1.60-3.39 g/kg; same for F. Symptoms included: depression; piloerection; hunched-back posture; emaciation; diarrhea; labored respiration; excessive salivation, red stains on muzzle, head and front. Necropsies revealed: lungs - congested; liver - necrotic, mottled; stomach - gas, fluid filled, injected; kidneys - congested; intestines - irritated, fluid and gas filled, injected; adrenals - congested; spleen - necrotic; autolysis.

Study Classification: Core Guideline Data.

Toxicity Category: III - CAUTION

2. Acute Dermal Toxicity - Rabbits; Hill Top
Ref. #80-636-21; July 15, 1980

Procedure: 5M, 5F New Zealand white rabbits (2530 - 2927g) with abraded skin were exposed to 2.0 g/kg of "Atrazine 90 WDG." Exposure was for 24 hours under occlusive wrap. Animals were observed for 14 days. All animals were subjected to necropsies.

Results: No mortalities. Signs of incomplete absorption. Symptoms observed were: erythema, edema, atonia, desquamation, nasal discharge, emaciation, slight depression. No gross pathological alterations observed.

Study Classification: Core Minimum Data.
Solid material must be slightly moistened.

Toxicity Category: III - CAUTION.

3. Acute Eye Application - Rabbits; Hill Top
Ref. #80-636-21; July 15, 1980

Procedure: One eye of each of 9 New Zealand white rabbits received a 0.051 g dose of "Atrazine 90 WDG." Three of the rabbits were treated with a rinse for 60 seconds with 200 ml of lukewarm tap water, 30 seconds post-exposure; remaining 6 were unrinsed. Scoring by Draize method at 24, 48, 72 hours; 4, 7 days.

Results: At 24 hours unrinsed eyes showed corneal opacity in 2/6 = 5, 1/6 = 10; no iris irritation; redness in 4/6 = 2, 1/6 = 1, 1/6 = 3; swelling in 1/6 = 1; discharge in 1/6 = 1. For unrinsed eyes all corneal opacity was gone at 7 days, but 1/6 showed slight scratching with fluorescein examination; only other irritation at 7 days was erythema in 1/6 = 1.

For rinsed eyes at 24 hours, corneal opacity in 1/3 = 5, 2/3 = 10; iris irritation in 1/3 = 1; erythema in 3/3 = 3; swelling in 3/3 = 1; discharge in 3/3 = 1. All corneal opacity gone at day 4; by day 7 only irritation was erythema in 1/3 = 1.

Study Classification: Core Supplementary Data.
Dosage must be 100 mg for solid substances. Note: units in days, not hours for tables 16, 17.

4. Primary Dermal Irritation - Rabbits;
Hill Top Ref. #80-636-21; July 15, 1980

Procedure: 6 New Zealand white rabbits received a 0.5 g sample of "Atrazine 90 WDG" at each of 4 sites (2 abraded, 2 intact). Substance was moistened with physiological saline prior to application. Exposure was for 24 hours under occlusive wrap. Animals were scored at 24, 72 hours.

Results: At 24 hours intact sites showed erythema in 3/12 = 1, 9/12 = 2 and edema in 5/12 = 1, 1/12 = 2; abraded sites exhibited erythema in 3/12 = 1, 5/12 = 2, 4/12 = 3 and edema in 2/12 = 1, 4/12 = 2. By 72 hours, intact sites with edema in 5/12 = 1, 2/12 = 2 and no edema; abraded sites with erythema in 7/12 = 1, 2/12 = 2 and no edema. The Primary Irritation Index was 1.73.

Study Classification: Core Guideline Data.

Toxicity Category: IV - CAUTION

ATRAZINE 90
WATER DISPERSIBLE GRANULE HERBICIDE

For season-long weed control
in corn and sorghum.

For weed control in certain
other crops; in noncrop areas;
and industrial sites.

ACTIVE INGREDIENTS:	
Atrazine (2-chloro-4-ethylamino-6-isopropylamino- s-triazine)	85.5%
Related Compounds	4.5%
INTERT INGREDIENTS:	10.0%
TOTAL:	<u>100.0%</u>

KEEP OUT OF REACH OF CHILDREN

CAUTION

STATEMENT OF PRACTICAL TREATMENT

In case of skin contact, wash immediately with soap and water.
Wash thoroughly after each use.

In case of eye contact, flush eyes with water for 15 minutes.
Get medical attention. Remove and wash clothing before reuse.

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS & DOMESTIC ANIMALS

CAUTION

Harmful if swallowed. This product is a skin irritant and sensitizer to some people. Do not get in eyes, or skin, or on clothing. Do not store near or contaminate feed for foodstuffs.

ENVIRONMENTAL HAZARD

~~This pesticide is toxic to fish. Use with care when applying in areas adjacent to any body of water. Keep out of lakes, streams, or ponds. Do not apply when weather conditions favor drift from target area. Do not contaminate water by cleaning of equipment or disposal of wastes.~~

DIRECTIONS FOR USE

GENERAL CLASSIFICATION

It is a violation of federal law to use this product in a manner inconsistent with its labeling.

STORAGE AND DISPOSAL

STORAGE: - Do not contaminate water, food, or feed by storage or disposal.

Open dumping is prohibited.

DISPOSAL: - Pesticide Disposal
Pesticide spray, mixture, or residue that cannot be used or chemically reprocessed should be disposed of in a landfill approved for pesticides or buried in a safe place away from water supplies.

Container Disposal
Dispose of in an incinerator or landfill approved for pesticide containers, or bury in a safe place.

Consult Federal, State or Local Disposal authorities for approved alternative procedures such as limited open burning.

NET CONTENTS: 10 lbs.

EPA REG. NO.

EPA EST. NO.

General Information:

This herbicide controls many annual broadleaf and grass weeds in corn, sorghum, sugarcane, pineapple, and certain other crops specified on this label. It is also effective in noncrop areas and industrial sites for control of most annual and many perennial broadleaf and grass weeds. This product may be applied before or after weeds emerge.

Where the use directions give a range of rates, use the lower rate on coarse-textured soil and soil low in organic matter, use the higher rate on fine-textured soil and soil high in organic matter.

Since this product acts mainly through root absorption, its effectiveness depends on moisture to move it into the root zone. If weeds develop, a shallow cultivation or rotary hoeing will generally result in better weed control.

~~This product is noncorrosive to equipment and metal surfaces, nonflammable, and has low electrical conductivity.~~

Avoid using where adjacent desirable trees, shrubs, or plants might be injured.

Store in dry place.

Note: HYDE does not recommend applications in combination with other herbicides or oils except as specifically described on the label.

Application Procedures:

Ground Application

For uniform distribution use fan-type nozzles. Screens in nozzles and in suction and in-line strainers should be no finer than 50-mesh. Use a pump with capacity to (1) maintain 35-40 psi at the nozzles, and (2) provide sufficient agitation in the tank to keep the mixture in suspension. Unless otherwise specified, use a minimum of 10 gallons of spray mixture per acre for all preplant, preemergence, and postemergence applications (with or without oil or surfactant).

For band applications, calculate the amount to be applied per acre as follows:

$$\frac{\text{band width in inches}}{\text{row width in inches}} \times \text{broadcast rate per acre} = \text{amount needed per acre}$$

Aerial Application

Use only where broadcast applications are specified. Apply a minimum of 1 gal. of water for each 1-1.5 lbs. of this product applied per acre. For postemergence treatments on corn and sorghum, apply the recommended rate in a minimum of 2 gals. of water per acre. Avoid applications under conditions where uniform coverage cannot be obtained or where excessive spray drift may occur.

Avoid application directly to humans or animals. Although it is unnecessary for flagmen or loaders to wear special protective clothing or equipment, care should be taken to avoid inhalation of dust or spray mist or prolonged contact with skin. Flagmen and loaders should wash thoroughly before eating and at the end of each day's operation.

Application in Water

Mixing procedure: (1) Be sure sprayer is clean and not contaminated with 2,4-D, residual oil, or other materials. (2) Fill tank half to two-thirds full with clean water. (3) Start agitation. (4) Pour this product directly from bag into tank. Let it wet and settle into the water. (5) Finish filling tank with water. Continue agitation during mixing and application.

Application in Liquid Fertilizer

Nitrogen solution or complete liquid fertilizer may replace all or part of the Nitrogen solution or complete liquid fertilizer may replace all or part of the water as a carrier for preemergence or preplant application on corn and sorghum. Do not apply after corn or sorghum has emerged as liquid fertilizer may cause crop injury.

Application in Water Plus Emulsifiable Oil

Adding oil to postemergence water-based spray on corn and sorghum may provide quicker kill of weeds. However, under certain conditions the use of oil may seriously injure the crop. To minimize this possibility, observe the following directions.

Use a crop oil designated for use with this product containing 1-2% emulsifier. Oils contaminated with water or other materials can cause compatibility problems and/or crop injury.

Mixing procedure: (1) Be sure sprayer is clean and not contaminated with 2,4-D or other materials as crop injury or sprayer clogging may result. (2) Fill tank half to two-thirds full with clean water. (3) Start agitation. (4) Pour this product directly from bag into tank. Let it wet and settle into the water. (5) Add emulsifiable oil after this product and water are mixed thoroughly. (6) Finish filling tank with water. (7) Empty the tank as completely as possible before refilling to prevent a buildup of oil in the tank. Keep the agitation system in operation to avoid separation of the oil from the water. (8) If an oil film starts to build up in the tank, drain it and clean out with a strong detergent solution or solvent. (9) Clean the sprayer thoroughly immediately after use by flushing the system with water containing a detergent.

Corn

Apply either before planting, at planting, or after planting using 1.1-4.4 lbs. per acre as indicated in the following directions for control of many annual broadleaf and grass weeds including barnyardgrass, witchgrass (*Panicum capillare*), yellow foxtail, green foxtail, wild oats, large (hairy) crabgrass, giant foxtail, velvetleaf (buttonweed), morningglory, lambsquarters, pigweed, ragweed, nightshade, purslane, and mustard.

Preplant (Broadleaf and Grass Control)

Broadcast in the spring after plowing at the appropriate rate in Table 1. Apply before, during or after final seedbed preparation. If soil is tilled or worked after application, avoid deep incorporation. Best results will be obtained when applied within two weeks before planting.

Preemergence (Broadleaf and Grass Control)

Apply during or shortly after planting before weed emergence at the appropriate rate in Table 1.

Postemergence (Broadleaf and Grass Control)

Apply before weeds exceed 1.5 inches in height, at the appropriate rate in Table 1.

TABLE 1 Broadleaf and Grass Control*

Soil texture	Broadcast rate per acre
Sand, loamy sand, sandy loam	2.2 lbs.
Loam, silt loam, silt, clay loam, sandy clay loam, silty clay loam, sandy clay, or silty clay with low organic matter	2.6 lbs.
Loam, silt loam, silt, clay loam, sandy clay loam, silty clay loam, sandy clay, or silty clay with medium to high organic matter and clay (including the dark prairie soils of the Corn Belt)	3.3 lbs.
Peat, muck, and high organic clay (apply postemergence only)	3.3 lbs.

*Broadleaf Control (western Kansas, western Nebraska, eastern Colorado, eastern Wyoming, New Mexico, West Texas, and the Pan Handle of Oklahoma). On sand, loamy sand, sandy loam, mild to strongly alkaline soils, and all recently leveled soil, apply many broadleaf

weeds including pigweed, lambsquarters, nightshade, purslane, and kochia will be controlled. On other soils in these areas, apply the appropriate rate in Table 1 for broadleaf and grass control.

Lay-by Treatment (Broadleaf and Grass Control)

Apply 1.2-2.2 lbs. per acre in a minimum of 10 gals. of water or nitrogen solution before weeds are 1.5 inches tall and corn is 20-30 inches tall. When using nitrogen solutions, direct the spray to the lower 3-4 inches of cornstalks to avoid corn foliage injury.

Postemergence with Emulsifiable Oil in Water

Broadleaf and Grass Weed Control: Apply 2.2 lbs. per acre after weed emergence, but before weeds reach 1.5 inches in height. Add 1 gal. of emulsifiable oil per acre for ground applications and 0.5 gal. per acre for aerial applications.

Broadleaf Weed Control: Apply 1.3 lbs. per acre for control of many broadleaf weeds including annual morningglory, cocklebur, lambsquarters, mustard, pigweed, ragweed, smartweed, and wild buckwheat. Apply before pigweed and lambsquarters reach 6 inches in height and before all other weeds reach 4 inches in height. Add 1 gal. of emulsifiable oil per acre for ground applications and 0.5 gal. per acre for aerial applications. A cultivation may be necessary if all weeds are not controlled or if weeds regrow.

Precautions for Postemergence with Emulsifiable Oil in Water:

- (1) Do not apply when crop is under stress from prolonged cold, wet weather, poor fertility, or other factors, or when crop is wet and succulent from recent rainfall as crop injury may occur.
- (2) Do not apply to inbred lines or any breeding stocks as injury may occur.
- (3) Adding other insecticides, herbicides, liquid fertilizers, or other materials is not recommended because they may cause compatibility problems or crop injury.
- (4) Store and handle emulsifiable oil carefully. Oil contaminated with even a small amount of water may not emulsify properly when added to the tank.
- (5) Do not make more than one application per season except as recommended for control of yellow nutsedge and Canada thistle.

Problem Weeds

Yellow nutsedge and Canada thistle: This product will control yellow nutsedge (*Cyperus esculentus*) and Canada thistle (*Cirsium arvense*) when applied according to directions. For best results, apply each year until yellow nutsedge or Canada thistle is eliminated or reaches a level of infestation where neither weed species is a problem. If yellow nutsedge or Canada thistle regrow following the last application, cultivate once.

Six alternative methods of use are listed in order of preference below for control of yellow nutsedge and Canada thistle. If other weed species, including annual grasses, are also expected, use alternative 2,3,5 or 6.

1. Apply 2.2 lbs. plus 1 gal. of emulsifiable oil per acre after the crop and yellow nutsedge and Canada thistle emerge, but before yellow nutsedge reaches a height of 3 inches or Canada thistle reaches a height of 6 inches. Repeat the application before lay-by (20-30 inches) 10-20 days after the first application.

2. Apply 2.2 lbs. per acre preplant. Follow with an application of 2.2 lbs. plus 1 gal. of oil per acre after the corn and weeds emerge, but before yellow nutsedge reaches a height of 3 inches (yellow nutsedge control only).
3. Apply 2.2 lbs. per acre during or shortly after planting, but before crop or weed emergence. Follow with an application of 2.2 lbs. plus 1 gal. of oil per acre after the corn crop and weeds emerge, but before yellow nutsedge reaches a height of 3 inches or Canada thistle reaches a height of 6 inches.
4. Apply 4.4 lbs. plus 1 gal. of oil per acre after the crop has emerged but before lay-by (20-30 inches) and after yellow nutsedge and Canada thistle emerge, but before yellow nutsedge is 3 inches tall or Canada thistle is 6 inches tall.
5. Apply 4.4 lbs. per acre preplant (yellow nutsedge control only).
6. Apply 4.4 lbs. per acre during or shortly after planting, but before crop or weed emergence (yellow nutsedge control only).

Note: Do not use alternative 1,2,3 or 4 when corn is wet or under stress. See "Precautions for Postemergence with Emulsifiable Oil in Water" for additional directions.

Quackgrass Control on Land Going into Corn Production
 Split application. Broadcast 2.2 lbs. per acre in the fall or spring and plow 1-3 weeks later. Apply 2.2 lbs. per acre in the spring before, during, or after planting, but before weeds are 1.5 inches high. This split application will control quackgrass and most annual broadleaf and grass weeds.

Single application. Broadcast 3.3-4.4 lbs. per acre in the fall or spring. Plow 1-3 weeks after application.

Tank Mixtures on Corn

Paraquat CL

For control of existing vegetation and residual control where corn will be planted directly into a cover crop, established sod, or in previous crop residues—Apply 2.2-3:3 lbs. of this product and 1-2 pts. Paraquat CL per acre in 20-30 gals. of water per acre. Add 8 fl. oz. of a nonionic surfactant per 100 gals. of spray mixture. ~~Add this product to spray tank, thoroughly mix with water,~~ and then add the Paraquat CL and surfactant.

Refer to the Paraquat CL label for further directions, limitation and cautions.

Alachlor 4EC

The tank mixture of this product with alachlor 4EC controls many annual broadleaf and grass weeds in corn (field and silage corn only) including annual morningglory, barnyardgrass, black nightshade, Brachiana, velvetleaf, carpetweed, cocklebur, crabgrass, fall panicum, Florida pusley, giant foxtail, green foxtail, yellow foxtail, goosegrass, lambsquarters, pigweed, purslane, mustard, common ragweed, smartweed and witchgrass.

For preplant application, apply within 7 days before planting and incorporate to a depth of 2-3 inches. For preemergence application, apply to the soil surface after planting, but before the crop of weeds emerge. For postemergence treatment, apply before weeds reach the 2-leaf stage, and before the corn is 3 inches tall.

Apply the appropriate rates from Table 2 in a minimum of 20 gals. of water per acre. Non-pressure fluid fertilizer may replace all or part of the water used as a carrier for applications applied to the soil surface before the crop emerges. Add this product to the spray tank, thoroughly mix with water, and then add the alachlor.

Refer to the alachlor 4EC label for further directions, limitations and cautions.

TABLE 2 Tank Mixture with Alachlor 4EC (Field and Silage Corn Only)

	Broadcast rate per acre			
	Less than 3% organic matter		More than 3% organic matter	
Soil texture	This product	Alachlor 4EC	This product	Alachlor 4EC
Sand, loamy sand, sandy loam	1.1 lbs.	1.5 qts.	1.1 lbs.	1.5 qts.
Loam, silt loam, silt	1.1-1.3 lbs.	1.75 qts.	1.3-1.5 lbs.	2 qts.
Clay loam, sandy clay loam, silty clay loam, sandy clay, silty clay, clay	1.3-1.7 lbs.	2.5 qts.	1.3-1.7 lbs.	2.5 qts.

Propachlor 65W

The tank mixture of this product with propachlor 65W controls many annual broadleaf and grass weeds in corn (field hybrid seed, silage and sweet corn only), including annual morningglory, annual ryegrass, barnyardgrass (watergrass), velvetleaf, carpetweed, cocklebur, crabgrass, fall panicum, Florida pusley, giant foxtail, green foxtail, yellow foxtail, goosegrass, groundsel, jimsonweed, lambsquarters, mustard, nightshade, pigweed, purslane, ragweed, smartweed, and sunflower. Apply 1.1-1.7 lbs. of this product plus 3.8-6.0 lbs. of propachlor 65W per acre to the soil surface any time after planting until broadleaves and grasses reach the 2-leaf stage. Use the lower rates on coarse-textured soil low in organic matter. Use the higher rates on fine-textured soil high in organic matter.

A minimum of 1.5 lbs. per acre of this product in the tank mixture will give better control of annual morningglory, velvetleaf, cocklebur and sunflower.

Apply in a minimum of 20 gals. of water per acre. Non-pressure fluid fertilizer may replace all or part of the water used as a carrier for applications applied to the soil surface before crop and weeds emerge. Add this product to the spray tank and thoroughly mix water. Then cut the propachlor 65W bag and fill with water to the fill line. Grasp the neck of the bag firmly, shake vigorously, and add to the spray tank.

Refer to propachlor 65W label for further directions, limitation and cautions.

Simazine 80W

The tank mixture of this product with Simazine 80W controls many annual broadleaf and grass weeds including fall panicum, crabgrass, foxtail, velvetleaf, carpetweed, morningglory, lambsquarters, pigweed and ragweed. This mixture may be applied either before planting, at planting, or after planting, but before the crop and weeds emerge. Apply in 20-40 gals. of water per acre.

Preplant Application: Apply at the appropriate rates in Table 3 during or after final seedbed preparation. If soil is tilled or worked after application, avoid deep incorporation. Best results will be obtained when the treatment is applied within two weeks before planting.

Preemergence Application: Apply during or shortly after planting, but before crop and weed emergence at the appropriate rates in Table.3.

Refer to the Simazine-80W label for further directions, limitations and cautions.

TABLE 3 Tank Mixture With Simazine 80W

Soil Texture	Broadcast rate per acre	
	This product	Simazine 80W
Sand, loamy sand, sandy loam	1.1 lbs.	1.25 lbs.
Loam, silt loam, silt, clay loam, sandy clay loam, silty clay loam, sandy clay, or silty clay with low organic matter	1.3 lbs.	1.5 lbs.
Loam, silt loam, silt, clay loam, sandy clay loam, silty clay loam, sandy clay, or silty clay with medium to high organic matter and clay (including the dark prairie soils of the Corn Belt)	1.6 lbs.	1.8 lbs.

Precautions for All Applications to Corn: (1) Do not apply more than 4.4 lbs. of this product per acre per year. (2) Following harvest, plow (moldboard or disk-plow) and thoroughly till the soil in the fall or spring to minimize possible injury to spring-seeded rotational crops, regardless of the rate used.

Note for All Applications to Corn: Do not graze or feed forage from treated areas for 21 days following application.

Rotational Crops

(1) Do not rotate to any crop except corn or sorghum until the following year or injury may occur. (2) If applied after June 10, do not rotate with crops other than corn or sorghum the next year or crop injury may occur. (3) If used at a rate higher than 3.3 lbs. per acre or equivalent band application rate, a crop of untreated corn or sorghum should precede the next rotational crop. (4) In the High Plains and Intermountain areas of the West where rainfall is sparse and erratic or where irrigation is required, use only when corn or sorghum is to follow corn or sorghum or when a crop of untreated corn or sorghum is to precede other rotational crops. (5) In western

Minnesota and eastern parts of the Dakotas, Nebraska and Kansas, do not rotate to soybeans if the rate applied to corn or sorghum was more than 2.2 lbs. per acre or equivalent band application rate, as soybean injury may occur. (6) Injury may occur to soybeans planted in north-central and northwest Iowa and south-central and southwest Minnesota, southeast South Dakota and northeast Nebraska the year following application on soils having a calcareous surface layer. (7) Do not plant sugar beets, tobacco, vegetables (including dry beans), spring-seeded small grains, or small-seeded legumes and grasses the year following application as injury may occur.

Sorghum and Sorghum-sudan Hybrids (Grain and Forage Types)

Apply either before planting, at planting, or after planting as indicated in the following directions. See the first paragraph of the Corn section for broadleaf and grass weeds controlled by a preplant, preemergence, or postemergence application.

Preplant (Broadleaf and Grass Control)

Apply in the spring after plowing at the appropriate rate in Table 4. Apply before, during, or after final seedbed preparation, if soil is tilled or worked after application, avoid deep incorporation. Best results will be obtained when applied within two weeks before planting.

Preemergence (Broadleaf and Grass Control)

Apply during or shortly after planting, before weed or crop emergence at the appropriate rate in Table 4.

TABLE 4

Preplant and Preemergence Broadleaf and Grass Weed Control in Sorghum*

Soil texture	Organic matter	Broadcast rate per acre
COARSE	Any level	DO NOT USE
Sand, loamy sand, sandy loam	Under 1%	(except for preemergence use on bedded sorghum in Arizona or California)
MEDIUM AND FINE	1-1.5%	1.7-2.2 lbs.
Loam, silt loam, silt, clay loam, sandy clay loam, silty clay loam, sandy clay, silty clay, clay	Over 1-1.5%	2.2-2.6 lbs.

*Do not apply preplant in N. Mex., Texas, Okla., Ark., La., Tenn., Miss., Ala., Ga., Fla., S. Car., or N. Car. or preemergence in N. Mex., Texas, or Okla., except in northeast Okla. and the Texas Gulf Coast.

In case of planting failure, sorghum may be replanted. Do not make a second broadcast application as injury may occur. If originally applied in a band and sorghum is replanted in the untreated row middles, this product may be applied in a band to the second planting.

Preemergence Broadleaf Weed Control in Furrow Irrigated Bedded Sorghum (Arizona and California only)

For preemergence control of many broadleaf weeds including groundcherry, lambsquarters, morningglory, mustard, pigweed, and purslane, apply 0.9-1.3 lbs. per acre after bed preparation either during or after planting, but before sorghum and weeds emerge and before the first furrow irrigation. Follow with several regular irrigations, making sure that all soil is thoroughly wet.

Precautions for Preemergence Applications to Furrow Irrigated Bedded Sorghum in Arizona and California: To avoid possible sorghum injury, do not use on sand or loamy sand soil or on sorghum planted in the furrow. Applications exposed calcareous or alkali subsoils, may result in crop injury. In case of crop failure, do not replant sorghum for 8 months following application. Corn may be planted immediately.

Postemergence Broadleaf and Grass Weed Control

Apply at the appropriate rate in Table 5 before weeds exceed 1.5 inches in height. Apply up to "close-in".

TABLE 5 Postemergence Broadleaf and Grass Weed Control in Sorghum

Soil texture	Minimum sorghum height at treatment	Broadcast rate per acre
Sand or loamy sand	DO NOT USE	
Sandy loam	See directions for postemergence broadleaf weed control	
Silt loam to sandy clay loam	Completely emerged	2.2-2.6 lbs.
Olton and Pullman clay soil	6 inches	2.2-2.6 lbs.
Silty clay loam and liner textured soil	Completely emerged	3.3 lbs.

Postemergence Broadleaf Weed Control with Emulsifiable Oil in Water

Apply 1.3 lbs. per acre for control of many broadleaf weeds including annual morningglory, cocklebur, lambsquarters, mustard, pigweed, ragweed, smartweed and wild buckwheat. Apply before pigweed and lambsquarters reach 6 inches in height and before all other weeds reach 4 inches in height. In Texas, New Mexico, Oklahoma, western Kansas, Colorado and the desert regions of California and Arizona, apply when sorghum is 6-10 inches tall, but before it reaches the boot stage. In all other areas, apply after sorghum reaches the 3-leaf stage. Add 1 gal. of emulsifiable oil per acre for ground application and 0.5 gal. per acre for aerial application. A cultivation may be necessary if all weeds are not controlled or if weeds regrow.

Precautions for Applications with Emulsifiable Oil in Water to Sorghum: See "Precautions for Postemergence with Emulsifiable Oil in Water" in the Corn section.

Postemergence Broadleaf Weed Control with Surfactant in Oklahoma, New Mexico, Texas, western Kansas, Colorado, and desert regions of Arizona and California only. Apply 1.3 lbs. plus 0.75-1.5 pts. of surfactant per acre after sorghum reaches 6 inches in height, but before weeds exceed 1.5 inches in height. Apply only on sandy loam for fine textured soil.

Precautions for all Applications to Sorghum: (1) Heavy rain immediately following application tends to result in excessive concentrations of herbicide in seed furrow, resulting in possible crop injury. Do not apply furrow-planted sorghum until furrows are leveled (plowed in). Level deep planter marks or seed furrows before application. (2) Application made to sorghum growing under stress caused by minor element deficiency or to sorghum grown on highly calcareous soils may result in crop injury. (3) Following harvest, plow (moldboard or disk-plow) and thoroughly till the soil in the fall or spring to minimize possible injury to spring-seeded

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Note: Do not graze or feed forage from treated areas for 21 days following application.

Rotational Crops

See "Rotational Crops" in the Corn section

Chemical Fallow

Summer Fallow-Winter Wheat' (Pacific Northwest Only)

These fallow programs control downy brome grass (cheatgrass), mustard and volunteer grain.

One year fallow program: Apply 0.4 lbs. in combination with dalapon (see dalapon label for rate). Apply to stubble following fall rains after volunteer grain begins growth, but before January 1. If weeds germinate in the spring, control them with stubble-mulch tillage. Apply only once. Do not plant spring cereals. Follow only with winter wheat.

Two year fallow program: Apply 1.7 lbs. in combination with dalapon as indicated above for one year program. Do not plant any crop for 2 years following application, and then plant only winter wheat.

Precautions: Avoid overlapping. Treat only silt loam, loam, clay loam, or clay, do not treat sandy soil.

Note: Do not graze livestock on growing wheat within 6 months after application.

Wheat-Sorghum-Fallow

This treatment controls annual broadleaf and grass weeds following wheat harvest and in the following sorghum crop when grown under minimum tillage.

Apply 3.3 lbs. to the wheat stubble immediately following wheat harvest. If weeds are present, remove them with a sweep plow or other suitable implement after application. Plant sorghum into the wheat stubble the following spring with minimum disturbance of the soil. Use a surface planter or a planter leaving a shallow furrow. If weeds are present at planting, remove them with a sweep plow or other suitable implement before planting.

Precautions: (1) Use only on silt loam or finer textured soil. (2) Wheat-sorghum-fallow cropping sequence must be followed. (3) Do not apply following sorghum harvest.

Note: Do not graze or feed forage from treated area to livestock. Do not plant any crop other than those on this label within 18 months following treatment.

Perennial Ryegrass Grown for Seed (Pacific Northwest only)

For the control of annual ryegrass and rattail fescue, apply 1.33 lbs. in at least 15 gals. water per acre after first fall rain.

Precautions: (1) Apply only to perennial ryegrass from which a seed crop has been harvested. (2) Do not apply to ryegrass more than 2 years in succession.

Note: Do not graze treated land within 10 days after application. Do not plant treated land to other crops for 16 months.

Sugarcane

For control of many nonrhizomatous weeds, including crabgrass, jungierice, wiregrass, foxtail, amaranths, Flora's paintbrush and firweed, apply 2.2-4.4 lbs. in 20-50 gals. of water at time of planting or ratooning, but before the cane emerges. One application may be made over-the-cane as it emerges and two additional directed spray applications may be made interline after emergence.

For control of emerged pellitory weed (artillery weed) in Florida only, apply 0.4-0.6 lbs. per acre in at least 40 gals. of water per acre as directed-spray. Add 2 qts. of surfactant for each 50 gals. of spray and be sure weed foliage is thoroughly covered.

Precautions: (1) Do not apply after "close-in". (2) Do not apply more than 11.1 lbs. per acre to one crop of cane.

Turf Grasses for Sod Production (St. Augustine, Centipede and Zoysia Grass)

Apply 2.2-4.4 lbs. per acre according to soil texture in the following chart.

Muck or peat	4.4 lbs.	Old beds: Within 2 days after tilling sod.
		New beds: 3-4 days after sprigging or plugging.
Sandy soil	2.2 lbs.	Old beds: Within 2 days after tilling sod.
		New beds: 7-10 days after sprigging or plugging.

If weeds regrow apply an additional 2.2 lbs. per acre on muck or peat or 1.1 lbs. per acre on sandy soil.

Precautions: (1) Do not apply within 30 days before cutting or tilling. (2) Do not apply in combination with surfactants or any other spray additives, as injury may occur. (3) Do not use north of North Carolina.

Macadamia Nuts

For premergence control of many broadleaf and grass weeds including crabgrass, foxtail, wiregrass, Flora's paintbrush, spanishneedles and firweed, apply 2.2-4.4 lbs. in 50 gals. of water per acre before harvest and just before weeds emerge. Repeat as necessary. Do not spray when nuts are on the ground during the harvest period. Do not apply aerially.

Pineapple

For the control of purslane, spanishneedles, annual grasses, annual bindweed, ageratum, amaranths, rattlepod, Flora's paintbrush, fireweed, spurge, indigo, and papalo, apply up to 7.1 lbs. per acre as a blanket spray immediately after planting following harvest.

Make additional blanket or interspace applications of up to 1.7 lbs. per acre at 1-2 month intervals as needed, prior to differentiation. Apply in 20-40 gals. of water per acre to assure thorough coverage.

Precautions: (1) Do not apply more than 33.3 lbs. per cycle. (2) Repeated monthly applications to plant foliage may slow plant growth and delay fruiting.

Note: Do not apply within 45 days of fruit harvest, or forage harvest if forage is to be fed to livestock.

Douglas Fir, Grand Fir, Noble Fir, White Fir, Lodgepole Pine, Ponderosa Pine, and Scotch Pine (Pacific Northwest-west of Cascades only)

Annual broadleaf and grass weed control: Apply 2.2-4.4 lbs. in 20-40 gals of water per acre between fall and early spring while trees are dormant or apply soon after transplanting. Apply before weeds are 1.5 inches tall.

Quackgrass control: Apply 4.4 lbs. per acre between fall and early spring while trees are dormant and before quackgrass is more than 1.5 inches tall.

Precautions: (1) Do not graze treated areas. (2) Do not apply to seedbeds. (3) Apply only once per year.

Nonselective Weed Control on Noncrop Land

This product provides long-term weed control on industrial sites, highway medians and shoulders, railroad rights-of-way, lumberyards, petroleum tank farms, and in noncrop areas on farms, such as around buildings, equipment and fuel storage areas, along fences, and lanes.

Apply before or soon after weeds begin growth. Make postemergence applications when weeds are young and actively growing. Use the higher rates on fine clay and muck soils. Use sufficient water to assure thorough coverage. Use at least 1 gal. of water for each pound of product, use more if practical.

Annual broadleaf and grass weeds (including barnyardgrass, cheatgrass, crabgrass, lambsquarters, foxtail, ragweed, puncturevine, and turkey mullein): Apply 5.3-11.1 lbs. per acre.

Hard-to-kill annual and perennial broadleaf and grass weeds (including bluegrass, burdock, Canada thistle, dogfennel, orchardgrass, plantain, quackgrass, purpletop, redtop and smooth brome): Apply 11.1-22.2 lbs. per acre.

Hard-to-kill biennial and perennial weeds (including bull thistle and sowthistle): Apply 22.2-44.4 lbs. per acre.

For longer residual control in regions of high rainfall and a long growing season, apply 22.2-44.4 lbs. per acre.

For small areas, 4 oz. per 1,000 sq. ft. is equivalent to 11.1 lbs. per acre.