

US EPA ARCHIVE DOCUMENT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

#63

DATE: May 19, 1980

SUBJECT: EPA Registration No. 11773-R
Atrazine 4L: Caswell No. 63



(23)

Releasable

FROM: Deloris F. Graham *DFG 6/9/80*
FHB/TSS *E 6/10/80*

TO: Robert J. Taylor
Product Manager (25)

Applicant: Van Diest Supply Company
Webster City, Iowa 50595

Active Ingredient:

2-Chloro-4-ethylamino-6-isopropylamino-s-triazine.	40.8%
Related Compounds.	2.2%
Inert Ingredient	57.0%

Background:

An Acute Oral, Acute Dermal, Acute Inhalation, Eye and Skin Irritation studies were submitted in support of the conditional registration of this product. These studies were conducted by Cosmopolitan Safety Evaluation (C.S.E.), Inc., Laboratory, 76 Fourth Street, Somerville, New Jersey. These data are under Accession Number 241725. The "Alternate" method of support was chosen.

Recommendation:

1. The Acute Oral, Acute Dermal, Eye and Skin Irritation Studies are acceptable to support the conditional registration for this product.
2. The Acute Inhalation Study is not acceptable. Please note the following:
 - a. Actual concentration, not the nominal concentration, must be greater than 5 mg/l.
 - b. Must submit calculations for actual concentration, and median particle size.
 - c. Chamber temperature and humidity must be submitted.
 - d. ^{Separate} LC50 and 95% confidence limits for males and females *must be submitted*

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Please see §163.81-3 of the enclosed "Proposed Guidelines for Human Hazard Evaluation" for more details concerning the Acute Inhalation test.

3. On Page 9, in the Acute Oral Study, Table I, the second 5.0 g/kg at 1 hours, it is assumed that 4 is a typographical error, please clarify; on Page 20, Table III, animal #M-2155 under lungs, what is the meaning of P?
4. FHB/TSS would have no objections to the conditional registration of this product provided an acceptable Acute Inhalation Study is submitted and the labeling revisions noted below are made.
5. Further label revisions may be required upon resubmission of an Acute Inhalation Study.

Label Recommendation:

1. The appropriate signal word is CAUTION.
2. The signal word CAUTION must appear on the front panel Preferably below the "Keep Out of Reach of Children" statement.
3. The precautionary statement must have the heading "PRECAUTIONARY STATEMENTS," with the subheading, "Hazards to Human and Domestic Animals," with the following statement.

CAUTION. Harmful if swallowed, inhaled or absorbed through skin. Avoid breathing vapors, dust or spray mist. Avoid contact with skin, eyes or clothing.
4. The statement of practical treatment must be revised similar to the following.

If swallowed, call a physician. If on skin, wash promptly with soap and water. Rinse thoroughly. If in eyes, rinse for at least 15 minutes with water and see a physician.
5. The statement, "Shake well before using.," should appear under Use Directions.
6. Please revise the "Environmental Hazards" statements to include the following:

"Do not contaminate water by cleaning of equipment or disposal of wastes."
7. The statement "Do not contaminate food or feed" must be placed under the "Directions for Use," not in the "Hazards to Human and Domestic Animals" section.

8. The statement, "Use entire contents at one time." should be deleted.

Review:

1. Acute Oral Toxicity Study: Cosmopolitan Safety Evaluation (C.S.E.) Inc., Laboratory Study #0178D

Procedure: 5M and 5F rats were given a 5 g/kg dose of Atrazine 4L. Because mortality was produced, 5 groups, each consisting of 5M and 5F rats were administered one of the following doses: 3.3, 4.0, 5.0, 6.3 and 7.9 g/kg. Observations were made during the first three hours and at 5 and 24 hours following dosing and twice daily for 14 days. Body weights were recorded. Necropsies were performed on all animals.

Results: At 3.2 g/kg, 1/2M and 2/5F died; at 4.0 g/kg, 3/5M and 2/F died; at 5.0 g/kg, 2/5M and 3/5F died; at 6.3 g/kg, 5/5M and 4/5F; at 7.9 g/kg, 4/5M and 4/5F. Symptoms observed included prone, oral discharge, subdued, piloerection, red colored fur, lacrimation, thin^{nas} ptosis, chromorhinorrhoea, tachypnea, chromodacryorrhoea, wheezing, trembling, vocalization. Necropsy of animals revealed lungs - congested, hemorrhagic, brains hemorrhagic; stained perineum, red fur, chromodacryorrhoea, oral discharge, lacrimation. One animal was not necropsied because it was frozen instead of refrigerated. Majority of survivors had lost weight by day 7, but had gained weight back by day 14. LD50 for males was 4.18 g/kg (3.27-5.35) and LD50 for females was 4.25 g/kg (3.08-5.95) and LD50 for males and females combined was 4.45 g/kg (3.62-5.47).

Study Classification: Core Guideline Data

Toxicity Category: III-CAUTION

2. Acute Dermal Toxicity Study: Cosmopolitan Safety Evaluation (C.S.E.), Inc. Laboratory Study #0178C

Procedure: 5M and 5F New Zealand white rabbits (2.5 to 2.3 kg) were applied a 2 g/kg dose of Atrazine 4L to abraded skin under occlusive wrap for 24 hours. Observations were made for 14 days after dosing. Necropsies were performed on all animals.

Results: No mortalities at 2 g/kg. A thick white residue was observed at the site after occlusive wraps were removed at 24 hours. All animals exhibited a moderate degree of erythema at 48 hours. From day 2 through day 14 animals appeared normal. LD50 is greater than 2 g/kg.

Study Classification: Core Guideline Data.

Toxicity Category: III-CAUTION

3. Acute Inhalation Study: Cosmopolitan Safety Evaluation
(C.S.E.), Inc., Laboratory Study #0178E.

Procedure: The exposure chamber was constructed in such a way that near the top of the chamber was a portal through which the test substance and airflow was introduced and the other side near the bottom a portal for exhaust with a vacuum. Airflow was established using a compressor, dryer, pressure regulator set at 15 p.s.i. and a flow meter. The test article was delivered from a Continuous -- Flow Nebulizer. Air was supplied at a flow rate of 4.75 l/minute at 15 p.s.i. to the nebulizer, partially filled with test material or in the case of the control to empty nebulizer. The delivery system was stabilized to give a concentration of in excess of 5 mg/l in the air.

5M and 5F rats were used for control groups and 5M and 5F rats for treated group. The treated group was exposed to a nominal concentration of 6.3 mg/l of the test material for four hours. All were observed at frequent intervals during four hour exposure period. The temperature was measured at the start of the period and at the end.

Results: No mortalities. Majority of animals gained weight. At 0-15 minutes, symptoms included hyperactivity, grooming, but by 1 hour all animals were back to normal. There were no visible abnormalities at necropsy of any of the animals except one instance of a dilated thoracic esophagus which was not test related. IC50 is greater than 5mg/l.

Study Classification: Core Supplementary Data

1. Calculations for actual concentration, and actual concentration must be greater than 5 mg/l.
2. Chamber temperature and humidity must be submitted.
3. Median particle size must be submitted.
4. IC50 and 95% confidence limits for males and females must be submitted.

4. Eye Irritation Study: Cosmopolitan Evaluation (C.S.E.), Inc.,
Laboratory Study #0177A.

Procedure: 9 New Zealand white rabbits (2.1 to 2.6 kg) received 0.1 ml of Atrazine in the right eye. 6 rabbits had treated, unwashed eyes, and 3 rabbits had treated washed eyes. Observations were made at 24, 48, 72 hours, 4 and 7 days.

Results: At 24 hours, no corneal opacity or iris irritation, but conjunctivae hyperemia in 6/6 (6/6 = 1) unwashed eyes and 1/3 (1/3 = 1) washed eyes. At day 7, conjunctivae hyperemia present in 1/6 (1/6 = 1) unwashed eyes, but was not present at day 10.

Study Classification: Core ^uGuideline Data

Toxicity Category: III - CAUTION

5. Skin Irritation Study: Cosmopolitan Safety Evaluation (C.S.E.), Inc., Laboratory Study #0178B.

Procedure: 6 New Zealand white rabbits (2.7 to 3.2 kg) received a 0.5 g dose of Atrazine 4L at two intact and two abraded skin sites under occlusive wrap for 24 hours. Observations were made at 24 and 72 hours.

Results: At 24 hours very slight to well-defined erythma and eschar at all intact and abraded^{5, 6} sites, and slight edema in 3/6 at intact and 4/6 at abraded sites. At 72 hours, no erythema or edema. Primary Irritation Score = 0.7.

Study Classification: Core Guideline Data

Toxicity Category: IV-CAUTION

Deloris F. Graham

ATRAZINE 4L

HERBICIDE

For season-long weed control in corn, sorghum, and certain other crops.

ACTIVE INGREDIENT

2 - Chloro- 4-ethylamino -6-	
isopropylamino- s- triazine	40.8%
Related Compounds	2.2%
Inert Ingredients	57.0%
TOTAL	100.0%

atrazine contains 4 lbs. active ingredient per gal.

Shake well before using. Use entire contents at one time.

CAUTION
KEEP OUT OF REACH OF CHILDREN

Statement of practical treatment

If swallowed- harmful or fatal if swallowed.
 Call A Doctor

If on skin- wash promptly with soap and water. Rinse thoroughly.

If in eyes- rinse eyes for at least fifteen minutes with water and see physician.

See side panel for additional precautionary statement

CONDITIONS OF SALE AND WARRANTY: Van Diest Supply Co. warrants that this material conforms to the chemical description on the label and is reasonably fit for the purposes referred to in the Directions for Use and Conditions for Sale, subject to the inherent risks referred to therein. Van Diest Supply Co. makes no other express or implied warranty, including any other express or implied warranty of FITNESS or of MERCHANTABILITY, and no agent of Van Diest Supply Co. is authorized to do so except in writing, with a specific reference to this warranty. Any damages arising from a breach of this warranty shall be limited to direct damages, and shall not include consequential commercial damages such as loss of profits or value, etc.

Manufactured for Van Diest Supply Co.
 Webster City, Iowa 50595

EPA Reg. No.
 EPA EST. No. 11773-IA-1

Net Contents

PRECAUTIONARY STATIONARY HAZARDS TO HUMANS
(& DOMESTIC ANIMALS)

CAUTION

Harmful or fatal if swallowed. Do not get in eyes.
Avoid contact with skin, inhalation of vapors or spray
mist, and contamination of food and feed.

ENVIRONMENTAL HAZARDS

Do not contaminate domestic or irrigation water supplies
or lakes, streams or ponds.

DIRECTIONS FOR USE

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

STORAGE AND DISPOSAL

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

Pesticide Disposal:

Pesticide, spray mixture or rinsate that cannot be
used or chemically reprocessed should be disposed of
in a landfill approved for pesticide or buried in
a safe place away from water supplies.

Container Disposal

Triple Rinse (or equivalent) and dispose in an incinerator
or landfill approved for pesticide container, or bury in a
safe place.

Consult Federal, State or Local Authorities for approved
alternative procedures.

GENERAL INFORMATION

This herbicide controls many annual broadleaf and grass weeds in corn and sorghum including barnyardgrass, witchgrass (*Panicum capillare*), yellow foxtail, green foxtail, wild oats, large (hairy) crabgrass, giant foxtail, velvetleaf, morningglory, lambsquarters, pigweed, ragweed, nightshade, purslane and mustard. This product may be applied before or after weeds emerge.

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

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

Note: Van Diest Supply Co. does not recommend application in combination with other herbicides or oils except as specifically described on the label or in literature published by Van Diest Supply Co.

Application Procedure

Ground application

For the most uniform distribution of broadcast applications, use 80° flat fan-type nozzles. For band applications use flat fan even spray nozzles. Screens and strainers should be no finer than 50-mesh. Use a pump with capacity to (1) provide sufficient agitation during mixing and application to keep material in suspension, and (2) maintain 30-40 psi operating pressure. Unless otherwise specified, use a minimum of 5 gal. of water/A for preplant incorporated, preemergence, and postemergence (without oil or surfactant) applications. Use a minimum of 10 gal. of water/A for all postemergence applications combined with oil or surfactant.

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

Band width in inches	X	Broadcast rate	=	Amount needed
<u>Row width</u> in inches		per acre		per acre of field

Aerial application

For preplant and preemergence broadcast treatments, apply at a 1:1 ratio to water (example, recommended rate of 1 qt of product is mixed with 1 qt of water) to be applied/A. For post-emergence treatments apply recommended rate in a minimum of 2 gal of water/A. Avoid applications under conditions where uniform coverage cannot be obtained or where excessive spray drift may occur.

Do not apply directly to humans or animals. Flagmen or loaders should avoid inhalation of spray mist and contact with skin and should wash thoroughly before eating and at the end of each day's operation.

Application in water

This product should be mixed with water and applied as a spray. Pour into tank during or after filling. Use hydraulic (Jet) or mechanical agitation during mixing and application to keep material in suspension. All return lines to tank must discharge below liquid level. Agitation should not be so violent as to cause air bubbles to form in the liquid. Wash sprayer thoroughly after use.

Application in liquid fertilizer

Nitrogen solutions or complete liquid fertilizers may replace all or part of the water as a carrier for preemergence and preplant applications. Mix as described under "Application in water." Do not apply after corn or sorghum emerges as there is danger of liquid fertilizers causing crop injury.

Application in water plus emulsifiable oil or oil concentrate. Adding emulsifiable oil or oil concentrate to postemergence water-based sprays may improve weed control. However, under certain conditions, use of either emulsifiable oil or oil concentrate may seriously damage corn or sorghum. To minimize this possibility, follow directions, procedures, and precautions below.

Use a crop oil designed for use with this product containing 1-2% suitable emulsifier, or a suitable crop oil concentrate designed for use with this product and containing not more than 20% emulsifier or surfactant blend. Several oils and crop oil concentrate of these types are on the market. Emulsifiable oil and oil concentrate contaminated with water or other materials can cause compatibility problems and or crop injury.

Mixing procedure (1) Thoroughly clean sprayer prior to use.

Do not use sprayer contaminated with 2,4-D or other materials as crop damage or sprayer clogging may result (2) Start to fill spray tank with clean water (3) Start agitation (4) Pour product directly from container into tank during filling (5) Add emulsifiable oil or oil concentrate after this product and water are mixed thoroughly (6) Finish filling tank with water (7) Empty tank as completely as possible before refilling to prevent build-up of oil in the tank. Maintain agitation to avoid separating of oil from water in spray mixture remaining in tank (8) If an oil film starts to build up in tank, drain it, and clean with a strong detergent solution or solvent (9) Clean sprayer thoroughly immediately after use by flushing system with water containing a detergent.

DIRECTIONS FOR USE

CORN

Apply before planting, at planting or after planting as indicated below.

Preplant (Broadleaf and grass control)

Broadcast in spring after plowing at rate in Table 1. Apply before, during, or after final seedbed preparation. If soil is tilled or worked after application, avoid deep incorporation. For best results, apply within two weeks prior to planting.

Preemergence (Broadleaf and grass control)

Apply during or shortly after planting, prior to weed emergence at rate in Table 1.

Postemergence (Broadcast and grass control)

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

TABLE 1
Broadcast and Grass Weed Control on Corn*

Soil Texture	Broadcast rate/A
COARSE Sand, loamy sand, sandy loam	4 pt.
MEDIUM Silt and clay loam low in organic matter	4.75 pt.
FINE Silt and clay loam with medium to high organic matter, clay including the dark prairie soils of the Corn Belt	6 pt.
Peat, muck high organic clay (postemergence only)	6 pt.

*Broadleaf weed control (eastern CO, western KS, western NE, NM, OK Pan Handle, west TX, and eastern WY): On sand, loamy sand, sandy loam, mild to strongly alkaline soil, and all recently leveled soil, apply 2.4 pt/A, either preplant or preemergence. Controls many broadleaf weeds including pigweed, lambsquarters, nightshade, purslane, and kochia. On other soil types in these areas, apply at rate in Table 1 for broadcast and grass control.

Lay-by treatment (Broadcast and grass control)

Broadcast 2-4 pt/A in a minimum of 5 gal of water or nitrogen solution, before weeds are 1.5 inches high and corn is 20-30 inches high. When using nitrogen solutions, direct the spray to lower 3-4 inches of cornstalks to avoid corn foliage injury. Maintain agitation in spray tank during application.

Postemergence with emulsifiable oil or oil concentrate in water.

Broadleaf and grass control: Broadcast 4 pt/A after weed emergence, but before weeds reach 1.5 inches in height. Add emulsifiable oil at rate of 1 gal/A for ground applications and 0.5 gal/A for aerial applications. Add oil concentrate at rate of 1 qt/A for ground applications.

Broadleaf control: Broadcast 2.4 pt/A for control of broadleaf weeds, such as annual morningglory, cocklebur, lambsquarters, mustard, pigweed, ragweed, smartweed, and wild buckwheat. Add emulsifiable oil at rate of 1 gal/A for ground applications and 0.5 gal/A for aerial applications. Apply before pigweed and lambsquarters reach 6 inches height and before all other weeds reach 4 inches in height. A cultivation may be necessary if all weeds are not controlled or if weeds regrow.

Precautions for applications with emulsifiable oil or oil concentrate 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) Inbred lines or any breeding stock may be severely injured by applications with emulsifiable oil or oil concentrate (3) Adding other insecticides, herbicides, liquid fertilizers, and other materials is not recommended because they may cause compatibility problems and/or crop injury, (4) Store and handle emulsifiable oil and oil concentrate carefully. Oil contaminated with even a small amount of water may not emulsify properly when added to tank (5) Do not make more than one application per season except as recommended for control of yellow nutsedge and Canada thistle on this label.

Center pivot sprinkler application- Preemergence or post-emergence (CO, KS, NE, SD, and WY)

Apply with irrigation water either after planting before corn and weeds emerge, or after corn emergence, but before lay-by (20-30 inches) and before weeds exceed 1.5 inches in height, at rates in Table 1. Prepare mixture with minimum ratio of 1 part product to 1 part water. Injecting a larger volume of a more dilute slurry per hour will assure more accurate calibration of metering equipment. Maintain sufficient agitation to keep herbicide in suspension. Meter slurry into irrigation water during entire period. Apply in $\frac{1}{2}$ -1 inch of water. Use the lower volume on coarser textured soils, the higher volume on finer textured soils. More than 1 inch of water may reduce weed control by moving herbicide below the effective zone in the soil. Inject dilute slurry into system through a positive displacement pump.

Refer to supplemental literature published by Van Diest Supply Co. for more information on calibrating.

Precautions: (1) Apply only through irrigation systems containing anti-siphon and check valves to prevent contamination of well during shutdown and overflow of solution tank. (2) Inject ahead of any right angle turn in the main line to insure adequate mixing (3) Chemical injection pumps and water pumps must have interlocking controls to insure simultaneous shutoff (4) Application when drift may occur from windy conditions, when system joints and connections are leaking, or when nozzles are not providing uniform distribution may cause crop injury. (5) Where sprinkler distribution patterns do not overlap sufficiently, unacceptable weed control may result. Where sprinkler distribution patterns overlap excessively, crop injury may result.

Problem weeds

Yellow nutsedge and Canada thistle: This product will control yellow nutsedge (*Cyperus esculentus*) and Canada thistle (*Cirsium arvense*) when applied according to use directions. For best results apply each year until yellow nutsedge or Canada thistle is eliminated or reaches a level of infestation where neither weed is a problem. If yellow nutsedge or Canada thistle regrow following last application, cultivate once. When this product is applied postemergence of the weeds, add 1 gal of emulsifiable crop oil or 1 qt of oil concentrate/A.

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

1. Broadcast 4 pt plus 1 gal of emulsifiable oil or 1 qt of oil concentrate/A, after crop and yellow nutsedge or Canada thistle emerge, but before yellow nutsedge reaches height of 3 inches or Canada thistle reaches a height of 6 inches. Repeat application before lay-by (20-30 inches), 10-20 days after the first application has been made.
2. Broadcast 4 pt/A preplant. Follow with an application of 4 pt. plus 1 gal of emulsifiable oil or 1 qt of oil concentrate/A, after corn and weeds emerge, but before yellow nutsedge reaches a height of 3 inches (yellow nutsedge control only).
3. Broadcast 4 pt/A during or shortly after planting, but prior to crop or weed emergence. Follow with an application of 4 pt plus 1 gal of emulsifiable oil or 1 qt of oil concentrate/A, after corn and weeds emerge, but before yellow nutsedge reaches a height of 3 inches or Canada thistle reaches a height of 6 inches.
4. Broadcast 8 pt plus 1 gal of emulsifiable oil or 1 qt of oil concentrate/A after crop emerges, but prior to 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. Broadcast 8 pt/A preplant (yellow nutsedge control only).
6. Broadcast 8 pt/A during or shortly after planting, but prior to crop or weed emergence (yellow nutsedge control only).

Note: Do not use emulsifiable oil or oil concentrate when corn is wet or under stress, especially when using 8 pt of this product/A. See "Precautions for applications with emulsifiable oil or oil concentrate in water" for additional directions.

Quackgrass control on land going into corn production
Split application. Broadcast 4 pt/A in fall or spring. Plow 1-3 weeks later. Broadcast a second application at 4 pt/A in spring before, during or after planting, but before weeds are 1.5 inches high. This split application will control both quackgrass and most annual broadcast and grass weeds.

Single application: Broadcast 6-8 pt/A in fall or spring. Plow 1-3 weeks later.

Tank Mixture on Corn

Dual[®] 6E

Use as tank mixture to control certain broadleaf and grass weeds in corn. Refer to Dual 6E label for all directions, weeds controlled, precaution and limitations.

Lasso[®] or Lasso EC/ (alachlor)

Use as tank mixture for control of many annual broadleaf and grass weeds in corn (field, hybrid seed, silage, sweet, popcorn) including barnyardgrass, carpetweed, crabgrass, fall panicum, Florida pusley, foxtails (giant, green, yellow), goosegrass, jimsonweed, kochia, lambsquarters, mustard, nightshade, pigweed, purslane, ragweed, signalgrass (Brachiaria), smartweed, and witchgrass. This tank mix will reduce competition from the hard to control annual weeds—annual morningglory, cocklebur, and velvetleaf (buttonweed).

For preemergence or early postemergence broadcast application, use rates in Table 2. Apply tank mixture any time from immediately after planting until weeds reach 2-leaf stage and corn is no more than 5 inches tall. On sweet corn, apply before crop and weeds emerge. Application after the 2-leaf weed stage will not give satisfactory control. With postemergence application, occasional corn leaf burn should not affect growth or yield. If applied with liquid fertilizers, spray before crop emerges.

TABLE 2
Tank Mixture with Lasso on Corn

Soil Texture	Broadcast rate/A			
	Less than 3% organic matter		3% or more organic matter	
	This Product	Lasso	This Product	Lasso
COARSE* Sand loamy sand sandy loam	2 pt	1.5 qt	2 pt	1.5 qt
MEDIUM Loam silt loam silt	2-2.4 pt	1.75 qt	2.4-2.8 pt	2 qt
FINE Silty clay loam, sandy clay loam silty clay sandy clay, clay loam	2.4-3.2 pt	2.25 qt	2.4-3.2 pt	2.5 qt

*When applied via center pivot irrigation on coarse soils, apply 2 pt of this product and 2 qt of Lasso/A.

For preplant incorporated applications, use 0.4 pt more of this product plus 0.5 qt more Lasso/A than indicated in Table 2. Use no more than 3.2 pt of this product plus 2.5 qt of Lasso/A. Broadcast within 7 days before planting and incorporate 2 inches deep.

Apply tank mixture in a minimum of 20 gal of water/A. Liquid fertilizer may replace all or part of the water. Add this product to spray tank, thoroughly mix with water, then add Lasso. Follow mixing procedures in the section, "Application Procedures," of this label.

Refer to Lasso label for information concerning center pivot irrigation applications and other directions, limitations and cautions.

Princep[®] 80W or Princep 4L

Use as tank mixture for control of many annual weeds including carpetweed, crabgrass, fall panicum, foxtail, lambsquarters, morningglory, pigweed, ragweed, and velvetleaf. Apply before planting, at planting, or after planting, but before crop and weeds emerge, at rates in Table 2a. Use 1:1 ratio for control of above weeds. Use 1:2 ratio for expected heavy infestations of crabgrass and fall panicum. Apply in a minimum of 20 gal of water/A. Cultivate shallow if weeds develop.

Preplant. Apply in spring during or after final seedbed preparation. If soil is tilled or worked after application, avoid deep incorporation. For best results, apply within two weeks before planting.

Preemergence. Apply during or shortly after planting, but before crop and weeds emerge.

Refer to Corn sections of this label and to Princep 80W or Princep 4L label for further directions, limitations, and cautions.

TABLE 2a
Tank Mixtures with Princep on Corn

Soil Texture	Broadcast rate/A			
	1:1 Ratio*		1:2 Ratio**	
	This product	Princep 80W or Princep 4L	This product	Princep 80W or Princep 4L
Sand loamy sand, sandy loam	2 pt	1.25 lb. or 2 pt	1.32 pt	1.67 lb. or 2.67 pt
Loam, silt loam, silt, clay loam, sandy clay loam, silty clay loam, sandy clay, or silty clay with low organic matter	2.4 pt	1.5 lb or 2.4 pt	1.6 pt	2 lb or 3.2 pt
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 (in- cluding dark prairie soils of the Corn Belt)	3 pt	1.8 lb. or 3 pt	1.92 pt	2.4 lb or 3.84 pt

*For control of above weeds.

**For control of expected heavy infestations of crabgrass and fall panicum.

Propachlor 65WP

Use as tank mixture for control of many annual broadcast and grass weeds in corn (field, hybrid seed, silage and sweet corn only) including annual morningglory, annual ryegrass, barnyardgrass (watergrass), buttonweed (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. Broadcast

2.1-3.2 pt of this product plus 3.8-6 lb of propachlor 65WP/A on soil surface any time after planting until broadleaf and grass weeds reach the 2-leaf stage. Use lower rates on coarse-textured soil low in organic matter. Use higher rates on fine-textured soil high in organic matter.

Use a minimum of 2.8 pt/A of this product in tank mixture for better control of annual morningglory, buttonweed (velvet-leaf), cocklebur, and sunflower.

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

Refer to propachlor 65WP label for further directions, limitations, and cautions.

Paraquat CL

For control of existing vegetation and residual control where corn will be planted directly into cover crop, established sod, or in previous crop residues, broadcast 4-6 pt of this product and 1-2 pt. Paraquat CL in 20-60 gal of water/A. Add 8 oz. of a nonionic surfactant, such as X-77 per 100 gal of dilute spray. Add this product to water in spray tank, agitate until thoroughly mixed with water, and then add Paraquat CL and surfactant.

Princep® 80W plus Paraquat CL

Use as tank mixture with Princep 80W plus Paraquat CL for kill of existing vegetation and residual weed control where corn will be planted directly into cover crop, established sod, or in previous crop residues. Add this product and Princep 80W to water in spray tank, agitating until thoroughly mixed. Then add Paraquat CL and a nonionic surfactant, such as X-77. Continue agitation during application. Apply 2-4 pt of this product plus 1.25-2.5 lb Princep 80W plus 1-2 pt Paraquat CL in 20-60 gal of water per sprayed acre within 3 weeks before, during, or after planting, but before corn crop emerges. Add 8 fl. oz. of a nonionic surfactant such as X-77, per 100 gal diluted spray. Use lower rates of this product and of Princep 80W on coarse soil, and higher rates on fine-textured soil. Use the 2 pt rate Paraquat CL if existing vegetation is 4-6 inches tall. This mixture will not control weeds taller than 6 inches.

Refer to further limitations and precautions on labels for this product, Princep 80W and Paraquat CL.

Precautions for all applications to corn: (1) Do not apply more than 8 pt/A of this product to corn in any one year. (2) Following harvest, plow (moldboard or disk-plow) and thoroughly till soil in fall or spring to minimize possible injury to rotational spring-seeded crops, regardless of rate used.

*Note for all applications to corn: Do not graze or feed forage from treated areas to livestock for 21 days following application.

Rotational crops

(1) Do not rotate to any crop except corn or sorghum until the following year, as injury may occur, (2) If applied after June 10, do not rotate with crops other than corn or sorghum the next year, as crop injury may occur. (3) If used at a rate higher than 6 pt/A 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 eastern parts of the Dakotas, KS, western MN and NE do not rotate to soybeans if the rate applied to corn or sorghum was more than 4 pt/A or equivalent band application rate, as soybean injury may occur (6) Injury may occur to soybeans planted in north-central and northwest IA, south-central and southwest MN, northeast NE, southeast SD, and other areas 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 before planting, at planting or after planting. See Corn section for weeds controlled.

Preplant (Broadleaf and grass control)
Broadcast in spring after plowing at rate in Table 3. Apply before, during, or after final seedbed preparation. If soil is tilled or worked after application, avoid deep incorporation. For best results, apply within two weeks prior to planting.

Preemergence (Broadleaf and grass control)
Apply during or shortly after planting, but prior to weed or crop emergence at rate in Table 3.

TABLE 3
Preplant and Preemergence for Broadleaf
and Grass Weed Control in Sorghum*

Soil Texture	Organic matter	Broadcast rate/A
COARSE Sand, loamy sand, sandy loam, sandy clay loam	any level	DO NOT USE (except for preemergence use on bedded sorghum in AZ and CA as indicated below)
MEDIUM AND FINE Silt loam, clay loam, clay	less than 1%	
	1-1.5%	
	more than 1.5%	4-4.75 pt

*Do not apply preplant in AL, AR, FL, GA, LA, MS, NC, NM, SC, TN and TX. Do not apply preemergence in NM, OK, and TX except in northeast OK and the TX Gulf Coast.

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

Preemergence broadcast control in furrow irrigated bedded

For preemergence control of broadleaf weeds, including groundcherry, lambsquarters, morningglory, mustard, pigweed, and purslane, broadcast 1.6-2.4 pt/A. Apply after bed preparation, during or after planting, but before sorghum and weeds emerge, and before the first furrow irrigation. Follow with several regular irrigations to thoroughly wet all soil. Use lower rate on coarse-textured soil and soil low in organic matter, use higher rate on fine-textured soil and soil high in organic matter.

Precautions for preemergence application to furrow irrigated bedded sorghum grown in AZ and CA: To avoid possible sorghum injury, do not use on sand or loamy sand soil or on sorghum planted in the furrow. Application to sorghum growing on alkali soil or where cuts, fills or erosions have exposed calcareous or alkali subsoil, may cause crop injury. Do not replant sorghum for 8 months following application. Corn may be planted immediately.

Postemergence (Broadleaf and grass control)
Apply at rate in Table 4 before weeds exceed 1.5 inches in height. Apply up to "close-in."

TABLE 4
Postemergence Broadleaf and Grass Weed Control
in Sorghum

Soil texture	Minimum sorghum height at treatment	Broadcast rate/A
Sand or loamy sand	DO NOT USE	
Sandy loam	See directions for broadcast weed control below	
Silt loam to sandy clay loam	Completely emerged	4-4.75 pt
Olton and Pullman clay soil	At least 6 inches high	4-4.75 pt
Silty clay loam and finer textured soil	Completely emerged	6 pt

Postemergence broadcast control with emulsifiable oil or oil concentrate in water.

Broadcast 2-4 pt/A for control of broadcast 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 CO, western KS, NM, OK, TX and the desert regions of AZ and CA, apply when sorghum is 6-10 inches in height, but before boot stage. In all other areas, apply after sorghum reaches the 3-leaf stage. Add emulsifiable oil at 1 gal/A for ground applications and 0.5 gal/A for aerial applications. Add oil concentrate at 1 qt/A for ground applications. A cultivation may be necessary if all weeds are not controlled or if weeds regrow.

Precautions for applications with emulsifiable oil or oil concentrate in water: See "Precautions for application with emulsifiable oil or oil concentrate in water" in Corn section.

Postemergence broadleaf control with surfactant (CO, western KS, NM, OK, TX and desert regions of AZ and CA only) Broadcast 2.4 pt plus 0.75-1.5 pt of surfactant/A after sorghum reaches 6 inches in height, but before weeds reach 1.5 inches in height. Apply only on sandy loam and finer textured soil.

Precautions for all applications to sorghum: (1) Heavy rain immediately following application tends to cause excessive concentrations of herbicide in seed furrow, resulting in possible crop injury. Do not apply to furrow planted sorghum until furrows are leveled (plowed in). Level deep planter marks or seed furrows before application. (2) Application to sorghum growing under stress caused by minor element deficiency or to sorghum growing 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 rotational spring-seeded crops, regardless of rate used. (4) Injury may occur if both this herbicide, preplant or preemergence, and an at-planting systemic insecticide are used.

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

Rotational crops

See- "Rotational crops" in Corn section.

Tank Mixture on Grain Sorghum

Igran 80W

Use as tank mixture for control of certain broadleaf and grass weeds in grain sorghum. Refer to Igran 80W label for all directions, weeds controlled, precautions, and limitations.

Chemical Fallow

Wheat-Sorghum-Fallow

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

Apply 6 pt to 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 wheat stubble the following spring with minimum disturbance of the soil. Use a surface planter or a planter leaving 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.

Wheat-Corn-Fallow (KS, NE)

This product controls cheatgrass (downy brome, chess), kochia, mustards, pigweed, Russian thistle, wild lettuce, wild sunflower, and volunteer wheat during period after wheat harvest. Weed control may extend into following corn crop grown under minimum tillage.

Apply with ground equipment only.

Follow directions for use, notes, and precautions in the "Wheat-Sorghum-Fallow" section above, substituting corn for references to sorghum.

Wheat-Fallow-Wheat (CO, KS, MT, NE, ND, SD and WY)
For preemergence control of cheatgrass (downy brome, chess), common lambsquarters, field pennycress, kochia, mustard, Russian thistle, wild lettuce, and suppression of volunteer wheat during fallow period of a wheat-fallow-wheat rotation, apply 1-2 pt in 10-40 gal of water/A for ground application, or in a minimum of 5 gal of water/A for aerial application, on all soils except those listed under "Precautions." For control of pigweed and wild sunflower, use the higher rate. Apply to stubble ground. Treat only once during same fallow period.

If weeds are present at application, a tank mix with Paraquat CL may be used. Broadcast 1-2 pt of this product plus 1-2 pt of Paraquat CL in 20-60 gal of water/A by ground equipment. Add 0.5-1 pt of a nonionic surfactant, such as X-77, per 100 gal of spray mixture. Add this product to spray tank first and thoroughly mix with water. Then add Paraquat CL, followed by surfactant. Use the 2 pt rate of Paraquat CL if weeds are 4-6 inches tall. This mixture will not control weeds taller than 6 inches. Apply to stubble ground. Treat only once during same fallow period. Refer to Paraquat CL label for further directions, precautions, and limitations.

If weeds are present at application and this product is used alone, use either an approved contact herbicide before or after treatment, or tillage after treatment.

Use tillage to control weeds which escape during fallow period. Till before planting. For the product applied alone or in tank mixture with Paraquat CL, plant at least 2 inches deep and 12 months or more after application.

Precautions: (1) Do not use on sand soil. (2) Do not treat eroded hillsides, caliche and rocky outcroppings, or exposed calcareous subsoil. (3) Do not treat soils of the Rosebud and Canyon Series in western NE and adjoining counties in CO and WY. (4) Do not treat soils with calcareous surface layers. (5) Avoid spray overlap.

*Note: Do not graze treated areas within 6 months after application.

RangeLand

This product controls certain weeds, including cheatgrass (downy brome, chess), tumble mustard, sagewort and annual or common broomweed. Use lower rate where cheatgrass is major problem weed; use higher rate for other weeds.

For ground applications, use a minimum of 10 gal of water/A.

For aerial applications, use a minimum of 5 gal of water/A.

See "Application Procedures" for additional information.

Establishment of perennial range grasses (CA, ID, NV, OR, UT, WA)

Apply 1.6-2 pt/A in fall after rains begin but before ground freezes. Perennial grass may be seeded when rain begins the next fall following treatment. Plant in deep furrows such as those made by a deep furrow rangeland drill. Treated areas may be grazed 7 months after seeding. However, to provide sufficient time for establishment of desirable range grasses, treated areas should not be grazed until the fall following seeding.

Renovation of existing stands of perennial range grasses
Fall treatment in Central Great Plains (CO, KS, MT, NE, ND, SD, WY): Apply 1.6-2 pt/A in fall before ground freezes.

Spring treatment in Southern Great Plains (OK, TX): Apply 2 pt/A in spring before April 30.

Do not apply to crested and intermediate wheatgrasses. Do not cut or feed range grass hay. Do not graze treated areas within 7 months following fall application or 3 months following spring application. Apply only once per year.

Warm Season Perennial Range Grasses- Midwest
Switchgrass

For control of many annual broadleaf and grass weeds including cheatgrass, foxtails (giant, green and yellow), lambsquarters, pigweed, ragweed, smartweed and velvetleaf.

For ground application use a minimum of 15 gal of water/A.

Use only on loam, silt loam, silty clay loam, clay loam, and silty clay soils with at least 1 percent organic matter.

New seeding. Apply 2 qt/A after planting but before weeds emerge. Prepare a good, firm seedbed. Plant $\frac{1}{2}$ inch deep with a grassland drill (preferred method) or a conventional drill. If a conventional drill is used on prepared seedbeds, remove all tension from the disk openers. For best results, cultipack or roll after planting. Clip weeds that escape in July or August. Avoid clipping switchgrass seedlings.

Established stands: Apply 2 qt/A in April or early May, before weed emergence.

Rotational crops: See "Rotational crops" in Corn section.

Note: Do not cut for hay. Do not graze treated areas within 4 months following application at seeding or 3 months following

application to established switchgrass. Treat only once per year.

Sugarcane |

For control of many annual broadleaf and grass weeds, including amaranths, crabgrass, fireweed, Flora's paintbrush foxtails, junglerice, and wiregrass: Broadcast 2-4 qt in 20-50 gal of water/A for adequate coverage of the soil surface at time of planting or ratooning, but before cane emerges. One additional application may be made over cane as it emerges, and two additional applications may be made interline after emergence as directed sprays.

For control of emerged pellitory weed (Florida only): Apply 0.8-1.2 pt in at least 40 gal of water/A as a directed spray. Add 2 qt of surfactant for each 50 gal of spray. Thoroughly cover weed foliage.

Precautions: (1) Do not apply after "close-in" (2) Do not apply more than 10 qt/A to any one crop of cane.

For control of alexandergrass, large crabgrass, pellitory (artillery weed), and spiny amaranth, use one of the following methods at planting or ratooning (Florida only).

1. Apply 4 qt. in 20-50 gal of water/A preemergence, broadcast or banded. Follow with one or two broadcast or banded over-the-top applications as needed, postemergence to sugarcane and weeds, at 2 qt in 20-50 gal of water/A. Treat before weeds exceed 1.5 inches in height.

2. Apply 1-3 times as needed, at 2 qt in 20-50 gal of water/A either broadcast or banded over-the-top, postemergence to sugarcane and weeds. Treat before weeds exceed 1.5 inches in height.

Dual trademark of CIBA-GEIGY for metolachlor

U.S. Patent No. 3,937,730

Igran trademark of CIBA-GEIGY for terbutryn

U.S. Patent No. 3,634,062

Princep trademark of CIBA-GEIGY for simazine

Lasso trademark of Monsanto Company for alachlor