US EPA ARCHIVE DOCUMENT

1/24/76

FISH & WILDLIFE

100.0 Pesticidal Use

100.1 Methods/Directions/Rates:

General Information

Dual 6EC is a selective herbicide recommended as a preplant incorporated or preemergence treatment for the control of most annual grasses and certain broadleaf weeds.

Weeds Controlled	Weeds Partially Controlled
annual bluegrass	carpetweed
annual ryegrass	knotweed
barnyardgrass (watergrass)	lambsquarters
brachiaria	pigweed
**carpetweed	purslane
crabgrass	ragweed
fall panicum	Russian thistle
foxtail millet	sandbur
giant foxtail	smartweed
green foxtail	yellow nutsedge
Japanese millet	
**pigweed	
*sandbur	
Texas Panicum	
witchgrass	
yellow foxtail	
*yellow nutsedge	

*Preplant incorporated only
**Preemergence only

Mixing Instructions

Dual 6EC is an emulsifiable concentrate to be mixed with water or liquid fertilizer and applied as a spray. Fill the spray tank one-half to three-fourths full with water or liquid fertilizer, add the proper amount of Dual 6EC, then add the rest of the water or liquid fertilizer. Sufficient agitation should be provided during mixing and application to obtain and maintain a uniform emulsion.

For ground application apply Dual 6EC in a minimum of 15 gals. of water or liquid fertilizer per acre.

For aerial application use a minimum of 5 gals. of water per acre.

Sprayer Equipment: Use conventional spray equipment with fantype or flood jet nozzles. Wash sprayer thoroughly with clean water immediately after use.

Directions for Use

Dual 6EC Applied Alone

Dual 6EC may be applied either preplant incorporated or preemergence. Preplant Incorporated: Apply Dual 6EC to the soil and incorporate into the top 2-3 inches before planting. If the field is bedded and the corn is planted on beds, apply Dual 6EC after bed formation. Use a preplant incorporated application if furrow irrigation is used or when a period of dry weather after application can reasonably be expected. Preemergence: Apply Dual 6EC to the soil at planting or after planting but before the weeds and corn emerge.

Apply the appropriate rate from the following table. Within the rate ranges, use the low rate on soil relatively coarse-textured or low in organic matter; use the high rate on soil relatively fine-textured or high in organic matter; also use the high rate for best control of yellow nutsedge and weeds listed as partially controlled.

Soil Texture	Broadcast* Rate Per Acre	
	Less than 3% Organic Matter	3% Organic Matter or Greater
COARSE: Sand, loamy sand, sandy loam	2-2 2/3 pts.	2-2 2/3 pts.
MEDIUM: Loam, silt loam, silt	2-3 1/3 pts.	2 2/3-3 1/3 pts.
FINE: Silty clay loam, sandy clay loam, silty clay, sandy clay, clay loam, clay	2 2/3-3 1/3 pts.	3 1/3-4 pts.

*The amount of Dual 6EC needed for band treatment may be calculated by the formula:

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

Note: Extremely dry weather following application may reduce the effectiveness of Dual 6EC. If a 1/2-inch rain does not occur within 7 days after preemergence application, activate the herbicide by incorporating it into the top inch of soil. If weeds develop, cultivation is recommended.

Precaution: Under high moisture conditions on the coarser textured soils, while corn is germinating and becoming established, some temporary injury or stunting may occur at the higher recommended rates. The crop will normally outgrow this effect.

Rotational Crops

1. If Dual 6EC treated corn is lost (due to poor germination, hail, flood, insects, etc.), the area may be replanted immediately to corn. Do not make a second broadcast application of Dual 6EC. If the original application was banded and the second crop is replanted in the untreated row middles, a second banded treatment may be applied.

2. Do not plant any crop other than those listed on this label within 18 months after treatment.

Dual 6EC Plus AAtrex(R) 80W or AAtrex 4L Tank Mixture

Mixing Instructions: If AAtrex 80W is used, mix the proper amount of AAtrex 80W with water in a clean pail to form a slurry. Fill the spray tank one-half to three-fourths full with water or liquid fertilizer, add the AAtrex 80W slurry or AAtrex 4L and allow it to become dispersed, then add the Dual 6EC, and finally add the rest of the water or liquid fertilizer. Sufficient agitation must be provided during mixing and application to obtain and maintain a uniform suspension.

For ground application apply the tank mix in a minimum of 15 gals. of water or liquid fertilizer per acre.

For aerial application use a minimum of 5 gals. of water or liquid fertilizer per acre.

Sprayer Equipment: See General Information. Screens in nozzles in suction and in-line strainers should be no finer than 50-mesh.

Application: Apply either preplant incorporated or preemergence. Preplant Incorporated (PPI): Apply the tank mix to the soil and incorporate into the top 2-3 inches before planting. If the field is bedded and the corn is planted on beds, apply the tank mix after bed formation. Use a preplant incorporated application if furrow irrigation is used or when a period of dry weather after application

can reasonably be expected. Preemergence (Pre): Apply the tank mix to the soil at planting or after planting but before the weeds and corn emerge.

Apply the appropriate rates from the following table. Within the rate ranges in the following table, use the low rates on soil relatively coarse-textured or low in organic matter; use the high rates on soil relatively fine-textured or high in organic matter; also use the high rates for control of yellow nutsedge, cocklebur, jimsonweed, and velvetleaf.

Soil Texture	Broadcast* Rate Per Acre			
	Less than 3% Organic Matter		3% Organic Matter Or Greater	
	Dual 6EC	AAtrex 80W or AAtrex 4L	Dual 6EC	AAtrex 80W or AAtrex 4L
COARSE: Sand, loamy sand, sand loam	PPI: 1 2/3 pts. Pre: 1 1/3-1 2/3 pts.	PPI: 1.25 lbs. or 2 pts. Pre: 1-1.25 lbs. or 1.6-2 pts.	PPI: 1 2/3 pts. Pre: 1 1/3-1 2/3 pts.	PPI: 1.5 lbs. or 2.4 pts. Pre: 1-1.5 lbs. or 1.6-2.4 pts.
MEDIUM: Loam, silt loam, silt	PPI & Pre: 2 pts.	PPI & Pre: 1.5-2 lbs. or 2.4-3.2 pts.	PPI & Pre: 2-2 2/3 pts.	PPI: 2 lbs. or 3.2 pts. Pre: 1.5-2 lbs. or 2.4-3.2 pts.
FINE: Silty clay loam, sandy clay loam, silty clay, sandy clay, clay loam, clay	PPI: 2-2 2/3 pts. Pre: 2 2/3 pts.	PPI & Pre: 1.5-2 lbs. or 2.4-3.2 pts.	PPI & Pre: 2 2/3 pts.	PPI & Pre: 2-2.5 lbs. or 3.2-4 pts.

*The amounts needed for band treatment may be calculated by the formula:

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

Note: Extremely dry weather following application may reduce the effectiveness of Dual 6EC + AAtrex. If a 1/2-inch rain does not occur within 7 days after preemergence application, activate the herbicide combination by incorporating it into the top inch of soil. If weeds develop, cultivation is recommended.

Precaution: Under high moisture conditions on the coarser textured soils, while corn is germinating and becoming established, some temporary injury or stunting may occur at the higher recommended rates. The crop will normally outgrow this effect.

Rotational Crops

1. If corn treated with Dual 6EC + AAtrex is lost (due to poor germination, hail, flood, insects, etc.), the area may be replanted immediately to corn. Do not make a second broadcast application of Dual 6EC + AAtrex. If the original application was banded and the second crop is replanted in the untreated row middles, a second band treatment may be applied.

2. Do not plant any crop other than those listed on this label within 18 months after treatments.

Storage and Disposal

Do not contaminate water, food or feed by storage or disposal. Open dumping is prohibited. Do not reuse empty container. Pesticide, spray mixture, or rinsate 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. Triple rinse (or equivalent) and dispose of in an approved landfill or bury in a safe place. Consult Federal, state, or local disposal authorities for approved alternative procedures.

Environmental Hazards

Keep out of any body of water. Do not apply where runoff is likely to occur. Do not contaminate water by cleaning of equipment or disposal of wastes. Do not apply when weather conditions favor drift from areas treated.

Observe all cautions and limitations on labeling of all products used in mixtures.

100.2 Experimental Permit Program:

A. The USDA Crop Reporting Board in June, 1975 listed 77,527,000 acres of corn planted in 1975. The 2521 gals. of Dual 6EC requested will treat approximately 8403 acres of corn assuming an average dosage of 0.3 gals per acre. The 8403 acres represent about 0.01% of the total corn acres in the U. S. About 1200 locations will be treated with one or more treatments. Of these about 1000 will be locations where the farmer applies the product. Each farmer will receive 2 gallons of Dual 6EC for use in the experimental program with instructions to apply the product one or more of the ways shown on the experimental label (ground application only). The other 200 locations will be applied by CIBA-GEIGY personnel. Each of these 200 locations will have most of the treatments that appear on the experimental label, except only about 10 locations will have aerial treatments (each will be compared with identical ground treatments nearby).

Additionally, Dual 6EC will be applied in corn in tank mix combination with Cycle 80WP Herbicide under the proposed extension of EPA Temporary Permit No. 100-EXP-36G. CIBA-GEIGY's request of November 4, 1975 for that extension listed 182 gals. of Dual 6EC that would be applied in the tank mix with Cycle 80WP. That 182 gals. will come out of 2521 gals. requested herein since Dual 6EC does not have a registration.

Summarizing, the 2521 gals. will be used approximately in the following ways:

2000 gals. to farmers under extension of 100-EXP-38G
339 gals. to CIBA-GEIGY personnel under extension of 100-EXP-38G
182 gals. under extension of 100-EXP-36G
2521 gals. total

Note: EUP No. 100-EUP-36G (Cycle 80WP) is part of PP# 4G1469. That permit program was not submitted as part of this program (100-EUP-38G.....5G1553).

B. Crops

Corn (field, sweet, pop)

C. Major Geographical Use Areas

All 48 contiguous states (see attached table.....over)

SECTION G/2

States Involved, Amount of Product to be Used and Acreage to be Treated

State	Acres Treated	Dual 6EC	AAtrex 80W	AAtrex 4L	State	Acres Treated	Dual 6EC	AAtrex 80W	AAtrex 4L
Ala.	101	31	75	14	Nebr.	697	210	514	97
Ariz.	23	7	17	3	Nev.	21	7	16	3
Ark.	25	8	17	3	N.H.	23	7	17	3
Calif.	55	17	40	8	N.J.	34	11	24	9
Colo.	86	26	32	12	N. Mex.	28	9	22	4
Conn.	25	8	17	3	N.Y.	122	37	90	17
Dela.	32	10	24	5	N.C.	183	55	134	26
Fla.	70	21	50	10	N.D.	74	23	55	11
Ga.	227	66	166	31	Ohio	403	121	297	56
Ida.	21	7	16	3	Okla.	33	10	25	5
Ill.	983	295	724	136	Ore.	35	8	26	5
Ind.	629	189	464	87	Penn.	167	51	123	23
Iowa	1044	314	770	144	R.I.	21	7	16	3
Ks.	240	63	176	33	S.C.	67	21	50	10
Ky.	143	43	104	20	S.D.	384	116	284	53
La.	39	9	28	5	Tenn.	104	32	77	15
Maine	25	8	17	3	Texas	129	39	96	18
Md.	79	21	58	11	Utah	31	10	24	5
Mass.	24	8	17	3	Vt.	30	9	22	4
Mich.	247	74	182	34	Va.	100	30	74	14
Minn.	731	220	538	101	Wash.	29	9	22	4
Miss.	41	13	30	6	W. Va.	31	10	22	4
Mo.	323	97	238	45	Wisc.	376	113	227	52
Mont.	40	12	30	6	Wyo.	28	9	22	4
					Total	8403 acres 1/	2521 gals. 2/ 5/	6159 lbs. 3/ 5/	1171 gals. 4/ 5/

1/ According to the USDA, 77,527,000 acres of corn were planted during 1975. The 8403 acres of corn that will be treated under this experimental permit represent about .01% of the total corn acreage.

2/ Assumes that the average rate of Dual 6EC is .3 gals/A (2.4 pts/A).

3/ Assumes that the average rate of AAtrex 80W is 2 lbs/A.

4/ Assumes that the average rate of AAtrex 4L is .575 gals/A.

5/ The totals above represent these quantities of active ingredient:

2521 gals. Dual 6EC = 15,126 lbs. of CGA-24705.
6159 lbs. of AAtrex 80W = 4927.2 lbs. of atrazine.
1171 gals. of AAtrex 4L = 4684 lbs. of atrazine.

D. Details of Proposed Testing Program

The large plot testing during 1975 under the original permit eveluated Dual 6EC applied in water carrier with ground equipment preemergence and Dual 6EC tank mixed with AAtrex 80W (or AAtrex 4L) applied in water carrier with ground equipment preemergence. While the experimental label allowed aerial treatments, none were applied. Under the extension, aerial treatments will be applied in direct comparison with the identical ground treatments. The 1975 treatments will be further evaluated with commercial equipment particularly to compare them with the following new treatments:

Dual 6EC with fluid fertilizer carrier preplant incorporated

Dual 6EC with water carrier preplant incorporated ground

Dual 6EC with water carrier preplant incorporated aerial

Dual 6EC with fluid fertilizer carrier preemergence

Dual 6EC + AAtrex 80W with water carrier preplant incorporated ground

Dual 6EC + AAtrex 4L with water carrier preplant incorporated ground

Dual 6EC + AAtrex 80W with water carrier preplant incorporated aerial

Dual 6EC + AAtrex 4L with water carrier preplant incorporated aerial

Dual 6EC + AAtrex 80W with fluid fertilizer carrier preplant incorporated

Dual 6EC + AAtrex 4L with fluid fertilizer carrier preplant incorporated

Dual 6EC + AAtrex 80W with fluid fertilizer carrier preemergence

Dual 6EC + AAtrex 4L with fluid fertilizer carrier preemergence

E. Season of Use: planting season (March 1-July 1).

F. Plot size: at least 0.5 acre for each ground applied treatment and at least 5 acres for each aerially applied treatment. Approximately 250 acres will be treated aerially in the total program (assumes 5 aerial treatments each 5 acres in size at 10 locations).

101.0 Chemical & Physical Properties

101.1 2-chloro-N-(2-ethyl-6-methylphenyl)-N-(2-methoxy-1-methylethyl) acetamide

102.0 Behavior in the Environment

102.1 Soil

(1) Anaerobic Soil Study: Rate of degradation of ^{14}C-CGA-24705 is slower in anaerobic soil than in aerobic soil.

(2) Field Persistence: (a) 250 E.C. formulation was applied at 2.0 and 4.0# ai/A. Half-lives of extractable residues were less than 60 days, except for Nebraska soil which was about 30 days.

(b) CGA-24705 (ring labeled) at 2#/A. on a silt loam soil was studied. The rate of loss of total ^{14}C activity was such that a 1/2 life was about 14 weeks and 70% was degraded after one year. Very little change occurred between 16 weeks and one year.

(3) Metabolism in Soil: (a) Green Rouse Corn treated with 2# ai ring-labeled CGA-24705. Concentration of ^{14}C in soil went from 3.02 ppm at one day to 0.65 ppm at 16 wks. 1/2 life of ^{14}C soil is approx. 6 wks. The compound is very mobile by leaching.

(b) Corn in the field was treated with 2# ai/A ring-labeled CGA-24705. Halflife of total ^{14}C in soil was about 8 wks. The amount of ^{14}C that leached increased with time.

(4) Microbial Studies: CGA-24705 caused no reduction in number of type of fungi, bacteria, and actinomycetes found in soil. Further, CGA-24705 does not appear to be degraded by microbial activity.

(5) Leaching - Parent Compound: Compound leaches to considerable extent in sand, sandy loam, and loam. Leaches very little in silt loam and not at all in muck.

(6) Leaching - Metabolites: Aged ^{14}C metabolites leached into lower layers of soil and were found in high concentrations in the leached water.

(7) Runoff - Lab Study: 1# ai/A of ^{14}C-ring CGA-24705 was applied. The amount of compound found in runoff water and sediment comprised less than 5% of applied ^{14}C.

102.2 Water

(1) Photolysis: Photolysis takes place slowly under natural sunlight, and is greatly accelerated by U.V. light.

(2) Hydrolysis: Hydrolysis proceeds quickly at higher temperatures or very basic pH values. At 20°C, at pH 5, 7, 9, halflife is over 200 days. CGA would be stable to hydrolysis under normal environmental conditions.

102.3 Plant

CGA-24705 is taken up and conjugated by plants. Pesticide residues are bound in corn plants after 16 wks.

102.4 Animal

(1) Rat & Goat Metabolism: Majority of CGA-24705 is excreted through urine or feces. Trace amounts were found in expired air, milk, blood, fat, or tissues.

(2) (Bluegill) Fish Accumulation Study: Nominal 1000 mg/l and 10 mg/l concentrations were used. Tests were run for 70 days accumulation and 27 day withdrawal. (See attached Tables 4 & 5). Somewhat of a plateau is reached at the low level (10 mg/l) but primarily in the non-edible tissue. Note the tremendous difference in residue levels between the edible and non-edible portions of the fish at both the high and low levels.

All of the above information (including the attached Tables 4 & 5) was taken from reviews by F. Schenck (PP# 5G1553, 9/11/74), M. Segal (PP# 5F1606, 6/24/75) and (PP# 6G1708, 1/8/76). The actual reports were not examined. However, any conclusions I have drawn in DISCUSSION below are my own based on the above information.

103.0 Toxicological Properties

Previously submitted and reviewed. See previous reviews by J. Edmundson and S. Fredericks.

104.0 Hazard Assessment

104.1 Discussion

104.1.1 The toxicity data submitted so far is acceptable.

TABLE 4

RESIDUE ACCUMULATION IN BLUEGILL SUNFISH

HIGH LEVEL

Day Sampled	Concentration Water (µg/L)	Tissue (mg/kg) Edible	Tissue (mg/kg) Non Edible	Bioconcentration Ratios	
1	760	9.92		13.05	
3	990	11.67		11.79	
7	1430	12.58		8.80	
10	1400	10.88		7.61	
14	1150	13.00		11.30	
21	1200	14.00		11.66	
28	1425	12.83		9.00	
35	1150	21.00	(679.00)	18.26	(590.4)
42	1453	23.25	(581.00)	16.00	(399.9)
49	1075	16.00	(497.00)	14.88	(462.32)
56	1010	21.52		21.31	
63	845	24.17		28.60	
70	825	21.46	(583.20)	26.01	(706.91)
71*	0	13.28	385.80	--	--
73	0	16.75	155.00	--	--
77	0	14.33	73.80	--	--
80	0	19.83	25.60	--	--
84	0	14.50	15.12	--	--
91	0	14.38	--	--	--
98	0	11.69	12.52	--	--

*Withdrawal

TABLE 5

RESIDUAL ACCUMULATION IN BLUEGILL SUNFISH

LOW LEVEL

Day Sampled	Concentration Water (µg/L)	Tissue (mg/kg) Edible	Non Edible	Bioconcentration Ratios	
1	6.75	0.25		3.70	
3	8.85	0.39		4.41	
7	11.00	0.54		4.91	
10	9.30	0.45		4.84	
14	8.50	0.57		6.71	
21	8.70	0.89		10.47	
28	9.20	0.107		11.63	
35	9.30	0.126	(4.54)	13.55	(488.2)
42	10.20	0.142	(5.74)	13.92	(562.7)
49	9.08	0.152	(4.12)	16.74	(453.7)
56	11.09	0.177		14.87	
~~63~~	~~8.52~~	~~0.188~~		22.07	
70	9.73	0.187	(4.54)	19.22	(466.6)
71*	0	0.139	3.30	--	--
73	0	0.168	2.67	--	--
77	0	0.130	0.78	--	--
80	0	0.132	0.75	--	--
84	0	0.108	0.33	--	--
91	0	0.108	--	--	--
98	0	0.083	0.14	--	--

*Withdrawal

104.1.2 Prior to consideration for full registration, an acute oral LD_{50} for either mallard duck or bobwhite quail and an acute 48-hr LC_{50} for an aquatic invertebrate (Daphnia) are required under the new Sec. 3 Regulations.

104.1.3 The proposed use of Dual (CGA-24705) should provide minimal hazards to non-target mammals and birds. As yet, acute and subacute toxicity studies do not arouse any serious concerns. Further, metabolism studies in mammals appear to indicate fairly rapid excretion of CGA-24705 in urine and feces. Of particular concern, however, are the results from the bluegill sunfish accumulation study. Large amounts of residue (resulting in large bioconcentration ratios: approx. 500X) were found in non-edible tissue. Since CGA-24705 is very persistent in water and leaches readily, such residue buildups in "the wild" may be possible - especially considering the extensive crop acreages involved...Ifeel, therefore, that chemicals such as CGA-24705 are not only candidates for a fish reproduction study (as previously decided) but also are candidates for "secondary poisoning" studies using prey-eating birds and/or mammals and/or fish. The fish and wildlife section should keep these chemicals (with their potential hazards) in mind when the time may come to evaluate further such hazards.

105.0 Conclusions

The Environmental Safety Staff finds no objection to the proposed experimental use permit. Casual observations of the effects upon fish, birds and other wildlife should be noted and reported.

The "Environmental Hazards" paragraph should be modified to read as follows:

> "Keep out of lakes, streams and ponds. Do not apply when weather conditions favor run-off or drift from treated areas. Do not contaminate water by cleaning of equipment or disposal of wastes."

However, retain the statement "Observe all cautions...used in mixtures".

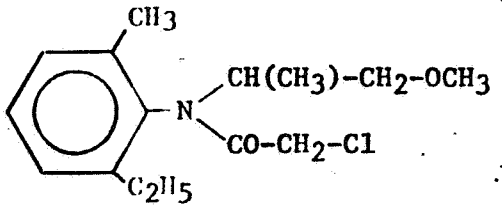
Prior to consideration for full registration, the following data (as required by the new Sec. 3 Regulations and proposed Guidelines) must be submitted. For Dual (CGA-24705): an acute oral LD_{50} using either mallard duck or bobwhite quail and an acute 48-hr LC_{50} on an aquatic invertebrate (Daphnia, usually).

A chronic fish study on Dual (CGA-24705) will be required as per our letter of August 12, 1975. Prior to initiation of this study, however, the Environmental Safety Section should be informed.

Norman J. Cook NC.
Environmental Safety Section
Efficacy & Ecological Effects Branch
January 24, 1976

Figure 1: Code Numbers, Structures and Nomenclatures of CGA-24705 and Related Compounds.

I. CGA-24705

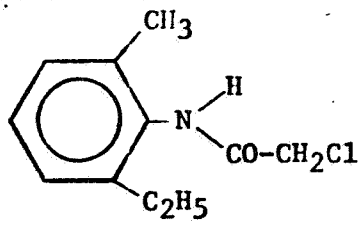


2-Chloro-N-(2-ethyl-6-methylphenyl)-N-(2-methoxy-1-methylethyl)acetamide

or

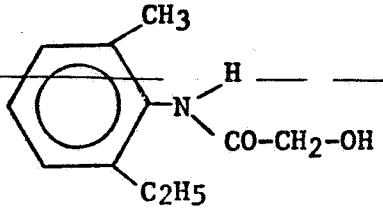
2-Chloro-6'-ethyl-N-(2-methoxy-1-methylethyl)-o-acetotoluidide

II. CGA-13656



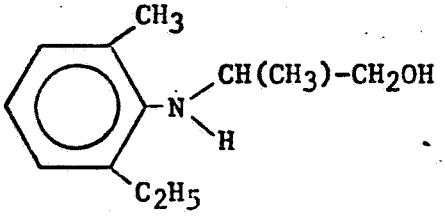
2-Chloro-N-(2-ethyl-6-methylphenyl)acetamide

III. CGA-37735



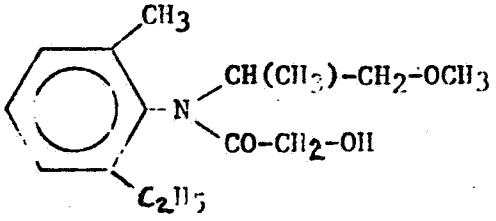
N-(2-Ethyl-6-methylphenyl)-2-hydroxyacetamide

IV. CGA-37913



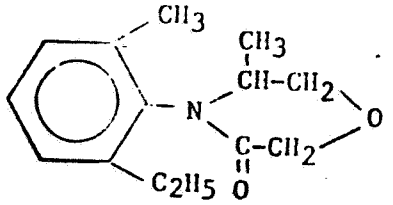
2-[(2-Ethyl-6-methylphenyl)amino]-1-propanol

V. CGA-40172



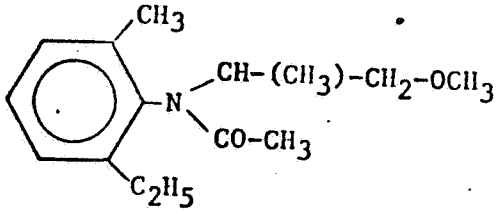
N-(2-Ethyl-6-methylphenyl)-2-hydroxy-N-(2-methoxy-1-methylethyl)acetamide

VI. CGA-40919



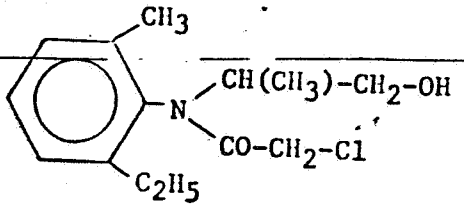
4-(2-Ethyl-6-methylphenyl)-5-methyl-3-morpholinone

VII. CGA-41507



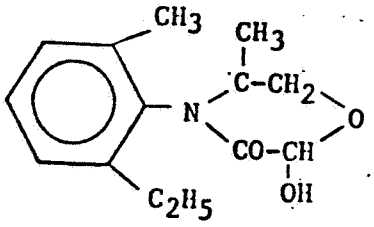
N-(2-Ethyl-6-methylphenyl)-N-(2-methoxy-1-methylethyl) acetamide

VIII. CGA-41638



2-Chloro-N-(2-ethyl-6-methylphenyl)-N-(2-hydroxy-1-methylethyl)acetamide

IX. CGA-49751



4-(2-Ethyl-6-methylphenyl)-2-hydroxy-5-methyl-3-morpholinone

revised 3/17/75

Dual™ 6EC

Herbicide

For weed control in corn

FOR EXPERIMENTAL USE ONLY

Active Ingredient: 2-chloro-*N*-(2-ethyl-6-methylphenyl)-*N*-(2-methoxy-1-methylethyl) acetamide	66.7%
Inert Ingredients:	33.3%
Total:	100.0%

Dual 6EC contains 6 lbs.
active ingredient per gal.

Keep Out of Reach of Children

DANGER

Hazards to Humans and Domestic Animals

Corrosive - causes eye damage. Do not get in eyes or on clothing. Wear goggles or face shield when handling.

Harmful if swallowed. Avoid inhalation and skin contact. Wash thoroughly after handling. Avoid contamination of food.

First Aid:
In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician. Remove and wash contaminated clothing before reuse.

Environmental Hazards

Keep out of any body of water. Do not apply where runoff is likely to occur. Do not contaminate water by cleaning of equipment or disposal of wastes. Do not apply when weather conditions favor drift from areas treated.

Observe all cautions and limitations on labeling of all products used in mixtures.

Experimental Use Permit No. 100-EUP-38G

Not for sale to any person other than a participant or cooperator of the EPA-approved Experimental Use Program.

General Information

Dual 6EC is a selective herbicide recommended as a preplant incorporated or preemergence treatment for the control of most annual grasses and certain broadleaf weeds.

Weeds Controlled	Weeds Partially Controlled
annual bluegrass	carpetweed
annual ryegrass	knotweed
barnyardgrass (watergrass)	lambsquarters
brachiaria	pigweed
**carpetweed	purslane
crabgrass	ragweed
fall panicum	Russian thistle
foxtail millet	sandbur
giant foxtail	smartweed
green foxtail	yellow nutsedge
Japanese millet	
**pigweed	
*sandbur	
Texas Panicum	
witchgrass	
yellow foxtail	
*yellow nutsedge	

*Preplant incorporated only
**Preemergence only

Mixing Instructions

Dual 6EC is an emulsifiable concentrate to be mixed with water or liquid fertilizer and applied as a spray. Fill the spray tank one-half to three-fourths full with water or liquid fertilizer, add the proper amount of Dual 6EC, then add the rest of the water or liquid fertilizer. Sufficient agitation should be provided during mixing and application to obtain and maintain a uniform emulsion.

For ground application apply Dual 6EC in a minimum of 15 gals. of water or liquid fertilizer per acre.

For aerial application use a minimum of 5 gals. of water per acre.

Sprayer Equipment: Use conventional spray equipment with fan-type or flood jet nozzles. Wash sprayer thoroughly with clean water immediately after use.

Storage and Disposal

Do not contaminate water, food or feed by storage or disposal. Open dumping is prohibited. Do not reuse empty container. Pesticide, spray mixture, or rinsate 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. Triple rinse (or equivalent) and dispose of in an approved landfill or bury in a safe place. Consult Federal, state, or local disposal authorities for approved alternative procedures.

Directions for Use

Dual 6EC Applied Alone

Dual 6EC may be applied either preplant incorporated or preemergence. Preplant Incorporated: Apply Dual 6EC to the soil and incorporate into the top 2-3 inches before planting. If the field is bedded and the corn is planted on beds, apply Dual 6EC after bed formation. Use a preplant incorporated application if furrow irrigation is used or when a period of dry weather after application can reasonably be expected. Preemergence: Apply Dual 6EC to the soil at planting or after planting but before the weeds and corn emerge.

Apply the appropriate rate from the following table. Within the rate ranges, use the low rate on soil relatively coarse-textured or low in organic matter; use the high rate on soil relatively fine-textured or high in organic matter; also use the high rate for best control of yellow nutsedge and weeds listed as partially controlled.

Soil texture	Broadcast* rate per acre	
	Less than 3% organic matter	3% organic matter or greater
COARSE: Sand, loamy sand, sandy loam	2-2 2/3 pts.	2-2 2/3 pts.
MEDIUM: Loam, silt loam, silt	2-3 1/3 pts.	2 2/3-3 1/3 pts.
FINE: Silty clay loam, sandy clay loam, silty clay, sandy clay, clay loam, clay	2 2/3-3 1/3 pts.	3 1/3-4 pts.

*The amount of Dual 6EC needed for band treatment may be calculated by the formula:

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

Note: Extremely dry weather following application may reduce the effectiveness of Dual 6EC. If a 1/2-inch rain does not occur within 7 days after preemergence application, activate the herbicide by incorporating it into the top inch of soil. If weeds develop, cultivation is recommended.

Precaution: Under high moisture conditions on the coarser textured soils, while corn is germinating and becoming established, some temporary injury or stunting may occur at the higher recommended rates. The crop will normally outgrow this effect.

Rotational Crops

1. If Dual 6EC treated corn is lost (due to poor germination, hail, flood, insects, etc.), the area may be replanted immediately to corn. Do not make a second broadcast application of Dual 6EC. If the original application was banded and the second crop is replanted in the untreated row middles, a second banded treatment may be applied.

2. Do not plant any crop other than those listed on this label within 18 months after treatment.

Dual 6EC Plus AAtrex® 80W or AAtrex 4L Tank Mixture

Use this tank mixture for control of these annual grasses and broadleaf weeds:

annual bluegrass
annual ryegrass
barnyardgrass
brachiaria
crabgrass
fall panicum
foxtail millet
giant foxtail
green foxtail
Japanese millet
quackgrass
sandbur
Texas panicum
witchgrass
yellow foxtail
yellow nutsedge
buffalobur
carpetweed
cocklebur
coffeeweed
common groundsel
henbit
jimsonweed
knotweed
kochia
lambsquarters
mallow
mayweed
morningglory
mustard
pigweed
poorjoe
prickly lettuce
common purslane
Florida purslane
ragweed
smartweed
sunflower
velvetleaf

Mixing Instructions: If AAtrex 80W is used, mix the proper amount of AAtrex 80W with water in a clean pail to form a slurry. Fill the spray tank one-half to three-fourths full with water or liquid fertilizer, add the AAtrex 80W slurry or AAtrex 4L and allow it to become dispersed, then add the Dual 6EC, and finally add the rest of the water or liquid fertilizer. Sufficient agitation must be provided during mixing and application to obtain and maintain a uniform suspension.

For ground application apply the tank mix in a minimum of 15 gals. of water or liquid fertilizer per acre.

For aerial application use a minimum of 5 gals. of water or liquid fertilizer per acre.

Sprayer Equipment: See General Information. Screens in nozzles and in suction and in-line strainers should be no finer than 50-mesh.

Application: Apply either preplant incorporated or preemergence. Preplant Incorporated (PPI): Apply the tank mix to the soil and incorporate into the top 2-3 inches before planting. If the field is bedded and the corn is planted on beds, apply the tank mix after bed formation. Use a preplant incorporated application if furrow irrigation is used or when a period of dry weather after application can reasonably be expected. Preemergence (Pre): Apply the tank mix to the soil at planting or after planting but before the weeds and corn emerge.

Apply the appropriate rates from the following table. Within the rate ranges in the following table, use the low rates on soil relatively coarse-textured or low in organic matter; use the high rates on soil relatively fine-textured or high in organic matter; also use the high rates for control of yellow nutsedge, cocklebur, jimsonweed, and velvetleaf.

Soil texture	Broadcast* rate per acre			
	Less than 3% organic matter		3% organic matter or greater	
	Dual 6EC	AAtrex 80W or AAtrex 4L	Dual 6EC	AAtrex 80W or AAtrex 4L
COARSE: Sand, loamy sand, sandy loam	PPI: 1 2/3 pts. Pre: 1 1/3-1 2/3 pts.	PPI: 1.25 lbs. or 2 pts. Pre: 1-1.25 lbs. or 1.6-2 pts.	PPI: 1 2/3 pts. Pre: 1 1/3-1 2/3 pts.	PPI: 1.5 lbs. or 2.4 pts. Pre: 1-1.5 lbs. or 1.6-2.4 pts.
MEDIUM: Loam, silt loam, silt	PPI & Pre: 2 pts.	PPI & Pre: 1.5-2 lbs. or 2.4-3.2 pts.	PPI & Pre: 2-2 2/3 pts.	PPI: 2 lbs. or 3.2 pts. Pre: 1.5-2 lbs. or 2.4-3.2 pts.
FINE: Silty clay loam, sandy clay loam, silty clay, sandy clay, clay loam, clay	PPI: 2-2 2/3 pts. Pre: 2 2/3 pts.	PPI & Pre: 1.5-2 lbs. or 2.4-3.2 pts.	PPI & Pre: 2 2/3 pts.	PPI & Pre: 2-2.5 lbs. or 3.2-4 pts.

*The amounts needed for band treatment may be calculated by the formula:

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

Note: Extremely dry weather following application may reduce the effectiveness of Dual 6EC + AAtrex. If a 1/2-inch rain does not occur within 7 days after preemergence application, activate the herbicide combination by incorporating it into the top inch of soil. If weeds develop, cultivation is recommended.

Precaution: Under high moisture conditions on the coarser textured soils, while corn is germinating and becoming established, some temporary injury or stunting may occur at the higher recommended rates. The crop will normally outgrow this effect.

Rotational Crops

1. If corn treated with Dual 6EC + AAtrex is lost (due to poor germination, hail, flood, insects, etc.), the area may be replanted immediately to corn. Do not make a second broadcast application of Dual 6EC + AAtrex. If the original application was banded and the second crop is replanted in the untreated row middles, a second band treatment may be applied.

2. Do not plant any crop other than those listed on this label within 18 months after treatments.

AAtrex® trademark of CIBA-GEIGY for atrazine
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Dual™ trademark of CIBA-GEIGY

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