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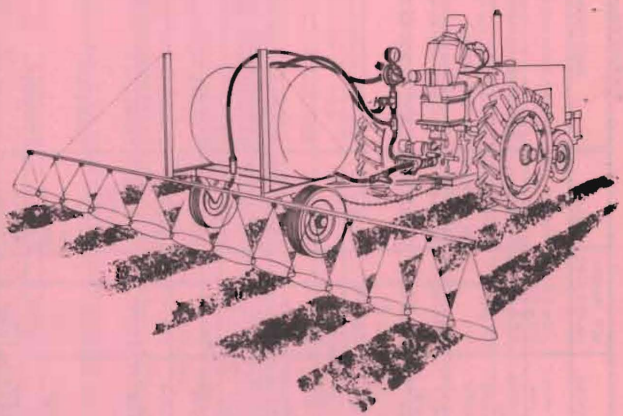
# CHEMICAL WEED CONTROL

## in Field Crops and for Perennial Weeds



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# CHEMICAL WEED CONTROL IN FIELD CROPS AND FOR PERENNIAL WEEDS

**WEED CONTROL** recommendations in this circular are based on information available from the North Dakota Agricultural Experiment Station and the Research Committee of the North Central Weed Control Conference.

Recommended rates are based on active ingredient or acid equivalent unless otherwise indicated. For example, 1 pint of 2,4-D (4 pounds 2,4-D acid per gallon) equals 1/2 pound of 2,4-D acid equivalent and 1 pound of dalapon powder equals 3/4 pound acid equivalent.

**SELECTIVE HERBICIDES** can be an effective supplement to good cultural practices in controlling weeds in field crop production. Timely applications of selective chemicals at the recommended rates will control many annual weeds satisfactorily without damaging the crop in which the weeds are growing. Perennial weeds such as field bindweed, leafy spurge, Canada thistle and perennial sowthistle in crops also can be controlled with chemicals.

To avoid crop injury and get good weed control, follow closely the instructions on the container. Consider both the crop tolerance and kind of weeds present in determining the rate to use.

Timely application of herbicides in growing crops is important. Weed competition reduces crop yield severely, unless weeds are removed when small.

Do not spray when there is danger of drift, or when winds are blowing toward a neighboring crop or planting more susceptible than the crop being sprayed. Ideal temperatures for applying herbicides are 65 to 85 degrees. Below 60 degrees, weeds are killed very slowly; above 90 degrees there is danger of crop injury.

**PREEMERGENCE HERBICIDES** in North Dakota have given erratic control. Performance varies from year to year and from field to field. Good weed control depends on many factors including rainfall after application, soil moisture, soil temperature and soil type. For these reasons, preemergence chemicals applied on the soil surface sometimes give unsatisfactory results. Those that can be incorporated into the surface soil usually have a better chance for success.

**CAUTION:**

The weed control suggestions given in this circular are based on the assumption that all herbicides used in the past will have established tolerances with the Food and Drug Administration or their manufacturers will have requested an extension of the current label.

The possibility of residues remaining on agricultural commodities from the use of herbicides has not been investigated at the North Dakota Agricultural Experiment Station. Therefore, no claims are made by the university or its employees that the herbicides discussed will or will not have residues. Any person who uses any of the herbicides mentioned in this circular does so at his own risk. Use each chemical only as recommended on the label of the container.

# CHEMICAL WEED CONTROL
## For Field Crops

| CROP | HERBICIDE | ACT. INGRED. LB. PER ACRE | WEEDS | WHEN TO APPLY | REMARKS |
|---|---|---|---|---|---|
| WHEAT, DURUM OR BARLEY 1/ | 2,4-D amine | 1/4 to 1/2 | Broadleaf | Crops--5th leaf to early boot | Apply not later than boot stage. Barley more sensitive than wheat. |
| | 2,4-D ester | 1/4 to 1/2 | | | |
| | MCPA amine or ester | 1/4 to 1/2 | Broadleaf | Crops--emergence to early boot | Can be applied much earlier than 2,4-D. |
| | Bromoxynil plus MCPA ester | 1/4 plus 1/4 | Wild Buckwheat and most broadleaf weeds | Crops--3rd leaf to boot stage | Trial use only. Apply when weeds are in early seedling stage. Commercial mixture is available. |
| WHEAT OR DURUM | Dicamba (Banvel D) | 2 oz (1/8 lb) | Wild Buckwheat | Crops--2nd through 4th leaf stage | Mix with 4 to 6 oz. per acre of MCPA for control of broadleaf weeds. Commercial mixture is available. |
| BARLEY | Dicamba | 1 oz (1/16 lb) | Wild Buckwheat | Crops--2nd through 3rd leaf stage | Trial use only. CAUTION: EARLY APPLICATION ESSENTIAL. HIGHER RATES OR LATER APPLICATION MAY RESULT IN CROP INJURY. |
| WINTER WHEAT OR RYE | 2,4-D amine | 1/4 to 1/2 | Broadleaf | Crops--fully tillered to early boot | Fall application not recommended. |
| | 2,4-D ester | 1/4 to 1/3 | | | |
| OATS 1/ 2/ | MCPA amine or ester | 1/4 to 1/2 | Broadleaf | Oats--emergence to early boot | Early jointing stage most sensitive. Possible injury to oats. |
| | Dicamba | 2 oz | Wild Buckwheat | Oats--2nd through 4th leaf stage | Mix with MCPA for control of other broadleaf weeds. |
| FLAX 1/ 2/ | MCPA amine | 1/4 or less | Broadleaf | Flax 2 to 6 in. tall | Use higher rates or esters only for hard-to-kill weeds. |
| | Dalapon (Dowpon) | 3/4 | Annual grass not wild oats | Best results obtained when flax is over 2 in. and weeds are under 2 in. tall. | Mix MCPA or 2,4-D 2/ with dalapon or TCA to control both broadleaf and annual grassy weeds. Legumes not injured by dalapon or TCA. |
| | TCA | 5 | | | |
| SMALL GRAIN PRE-HARVEST | 2,4-D ester | 1 | Broadleaf | Crops--early dough stage | Use only when weeds threaten to interfer with harvest operations. |
| SORGHUM AND MILLET | 2,4-D amine | 1/4 to 1/2 | Broadleaf | Sorghum--4 to 12 in. tall<br>Millet--5th leaf to early boot | Preemergence herbicides such as propachlor and propazine can be used in sorghum (propachlor not cleared for silage for dairy cows). |
| CORN | Propachlor (Ramrod) | 4 | Grasses and some broadleaf weeds | Preemergence | Wettable powder or granules available. Ineffective against wild mustard. |
| | Atrazine plus propachlor | 1 plus 3 | Broadleaf and annual grasses | Preemergence | Atrazine residue may still occur. |
| | Linuron (Lorox) plus Atrazine | 1 to 1½ plus 1 to 1½ | Broadleaf and annual grasses | Preemergence | Trial use only. Use the higher rate on heavy soils. |
| | Atrazine | 2 to 4 | Broadleaf and grasses | Preemergence | Atrazine may remain in soil longer than one year and may damage following crops other than corn. |
| | | 1 to 2 plus 1 to 2 qal. oil | Broadleaf and grasses | Early postemergence--weeds 1½ in. tall or less | Application when weeds are over 1½ in. may result in poor control. Use labelled non-phytotoxic oil only. Soil residues may still occur. |
| | 2,4-D amine | 1/4 to 1/2 | Broadleaf | Postemergence, corn--3 in. to tassel | Use drop nozzle when corn is over 8 inches tall. |
| | 2,4-D plus dalapon | 1/2 plus 1½ | Broadleaf and grasses | Postemergence directed--corn 8 to 20 in. tall | Use directed spray equipment with leaf lifters. Apply in a 14-inch band over the row. Spray no higher than the lower half of stalk (ground to whorl) or no higher than bottom 7 inches of stalk. |
| SOYBEANS and PINTO BEANS | CDAA (Randox) | 4 to 5 | Annual grasses not wild oats | Preemergence | Band application reduces cost. EPTC (Eptam) also may be used on Pinto beans at 3 lbs. per acre, preplant and incorporate. |
| | Amiben | 2 to 3 | Annual grasses and broadleaf | | Use 2 lbs. per acre Amiben on Pinto beans. Generally no wild oat control. |
| | Trifluralin (Treflan) | ½ to 1 | Grasses and broadleaf except mustard | Preplant and incorporate | Tandem disk in two directions 4 to 6 in. deep. |
| | Chloroxuron (Tenoran) | 1 | Wild mustard and some others NOT grasses | When weeds are less than 2 in. tall | Trial use only. Use as emergency wild mustard control measure. Must be applied with surfactant (Adjuvan T). Cleared for use on soybeans only. |
| SUNFLOWER | EPTC (Eptam) | 3 | Grasses and some broadleaf weeds | Preplant and incorporate | Generally gives short-term control. |
| SUGARBEETS (See later section for wild oat control) | Dalapon | 3 | Annual grasses not wild oats | After weeds are up | Apply while beets are small. |
| | TCA | 5 to 7 | Annual grasses not wild oats | Preemergence | Do not use tops for livestock feed. |
| | Endothall | 1 to 2 | Wild buckwheat | Beets--3-6 leaf and weeds emerged | Do not apply more than 40 days after beet emergence. |
| | Propachlor (Ramrod) | 3½ to 4 | Annual grasses and some broadleaf weeds. Not mustard | Preemergence | Trial use only. |
| GRASS Seedling | 2,4-D | ½ to ¾ | Broadleaf | After 3-leaf stage | Heavier rates may be used after grass is well tillered. |
| Established | 2,4-D | ¾ and up | Broadleaf | Weeds--emergence to bud stage | Apply when weeds are susceptible. |
| | Dicamba (Banvel D) | ⅛ to ½ | White cockle n. flowering catchfly and alfalfa | In spring when seed crop is 2 to 4 inches high | Use only in established perennial grasses grown for seed. |
| LEGUMES Alfalfa and clover with nurse crop | 2,4-DB | ½ to 1 | Broadleaf | Not before legumes are 2 inches tall | Sweetclover killed by 2,4-DB |
| | MCPA or 2,4-D amine | 1/8 to 1/4 | | | Delay to get weed and crop canopy. Possible injury to sweetclover and alfalfa. |
| Alfalfa trefoil or sweetclover alone. | Dalapon | ¾ to 1 | Annual grasses not wild oats | Weeds 1 to 2 in. tall | Seedling or old stands not for hay or pasture. Do not use with small grain nurse crop. Second year sweetclover may be injured. |
| | TCA | 5 | Annual grasses not wild oats | | |
| Established or seedling stage | 2,4-DB | ½ to 1 | Broadleaf | When weeds are small | 2,4-DB and dalapon can be mixed but no dalapon label clearance for hay or pasture. 2,4-DB must be applied 30 days before hay harvest or grazing. |

| WEED | HERBICIDE | RATE PER ACRE | CROP | WHEN TO APPLY | REMARKS |
|---|---|---|---|---|---|
| WILD OATS Selective control in crops | Triallate (Far-go) | 1¼ lb | Barley | Fall--after October 15 and until freeze up | Trial use only on wheat. Incorporate with harrow. Keep spring tillage to minimum. |
| | | 1 lb | Wheat | | |
| | | 1¼ lb | Barley | Immediately after planting | Apply on smooth soil surface and incorporate in top 2 inches by cultivation. |
| | | 1 lb | Wheat and durum | | |
| | Diallate (Avadex) | 1½ lb | Flax, sugarbeets and potatoes | Preplanting | Kills wild oats in soil for about six weeks. |
| | | | Corn and peas | Preplanting or preemergence | |
| | | 1½ lb | Flax and sugarbeets | Fall--after October 15 | Incorporate with harrow. Keep spring tillage to minimum. |
| | Barban (Carbyne) | 4 to 8 oz | Wheat, durum, barley, flax, peas and mustard | Wild oats--1½ leaf stage<br>Crops: Small grain before 4th leaf stage, flax before 12th leaf stage, peas before 6th leaf stage, mustard before true 3-leaf stage | Usually applied 4 to 9 days after wild oats emerge. Must apply before the 14th day and before small grain reaches 4th leaf stage to avoid serious crop injury and poor wild oat control. Use the higher rate only when growing conditions are not favorable. |
| | | 12 to 16 oz | Sugarbeets | | |
| | | 4 to 6 oz | Soybeans | Before the first trifoliate leaf stage or no later than 14 days after crop emerges | Do not feed treated soybean forage or pods to livestock. |
| FUMITORY | Triallate | 1¼ lb | Barley | Immediately after planting | Use only if wild oats also is a problem because of cost. Incorporate in top 2 inches of soil by cultivation. |
| | | 1 lb | Wheat and durum | | |
| | Diallate | 1½ lb | Flax | Preplanting | |
| | Bromoxynil plus MCPA ester | ¼ lb plus ¼ lb | Wheat and Barley | After fumitory is established to boot stage of crop | Trial use only. Apply in 10 to 15 gal. water per acre. |

1/ When used as a nurse crop for legumes or grasses, see later sections.
2/ 2,4-D is not recommended unless such hard-to-kill weeds as Russian thistle, wild buckwheat, smartweed, pigweed or sowthistle are present.

## CHEMICAL WEED CONTROL
### For perennial weeds

| WEED | HERBICIDE[1] | ACT. INGRED. LB. PER A. OR SQ. RD. | WHEN TO APPLY | REMARKS |
|---|---|---|---|---|
| FIELD BINDWEED (Creeping Jenny) On fallow | 2,4-D for large areas | 3/4 lb. per A. | Bud to bloom or fall | Cultivate fallow until mid-July, then spray. Respray in following year's crop. |
| Wheat and Barley | 2,4-D amine<br>2,4-D ester | 3/4<br>1/2 | Tiller stage of crop | Higher rates may injure crop but may be worthwhile, especially in small areas, to control bindweed. |
| Patches or individual plants | Benzabor | 1 to 1½ lb. per sq. rd. | Late fall or early spring | Apply dry--long soil sterility. |
| | TBA | 10 to 20 lb. per A. | Bud stage | Residual effect 1 year or more. |
| | Picloram plus 2,4-D (Tordon 212) | 1 gal. per A. | When bindweed is actively growing | Vegetation may not grow in treated area for some time. Tordon granules available. |
| | Dicamba (Banvel D) | 6 to 8 lb. per A. | When weed is actively growing | Apply to foliage and/or soil. |
| LEAFY SPURGE On fallow | 2,4-D ester for large areas | 1 to 2 lb. per A. | Early bud stage and fall | No cultivation before spraying. Apply both spring and fall. Respray in following year's crop. |
| Patches or individual plants[1] | Picloram plus 2,4-D (Tordon 212) | 1½ gal. per A. | Spring or fall | Most grasses are not killed. Tordon granules available. |
| | AMS (Ammate X)[2] | 1 lb. per sq. rd. | Summer | Use 2,4-D when seedlings appear. |
| | 2,4-D | 40 lb. per A. | After Sept. 20 | No permanent injury to perennial grasses. |
| | Dicamba (Banvel D) | 8 to 10 lb. per A. | When spurge is actively growing | Apply to foliage and/or soil. Most grasses are not harmed. |
| | Benzabor | 1 to 1½ lb. per sq. rd. | Late fall or early spring | Apply dry--long soil sterility. |
| CANADA THISTLE Patches or individual plants | Amitrole Amitrole-T | 4 lb. per A. | Pre-bud stage | Wet thoroughly. |
| | Dicamba (Banvel D) | 5 to 10 lb. per A. | When weed is actively growing | Apply to foliage and/or soil. |
| | Picloram plus 2,4-D (Tordon 212) | 1 gal. per A. | When thistles are actively growing | Apply to foliage and/or soil. |
| | 2,4-D ester | 1 lb. per A. | Bud stage | Retreat as needed. |
| Wheat and Barley | 2,4-D amine<br>2,4-D ester | 3/4<br>1/2 | Tiller stage of crop | Higher rates than listed may injure crop but may be worthwhile, especially in small areas, to achieve thistle control. |
| SOWTHISTLE[3] RUSSIAN KNAPWEED[3] & HOARY CRESS (P. PEPPERGRASS) | TBA | 10 to 20 lb. per A. | Bud stage | Not effective against hoary cress. Residual effect 2 years or more. |
| | Benzabor | 1 ½ lb. per sq. rd. | Late fall or early spring | Apply dry--long soil sterility. |
| QUACKGRASS On fallow | Dalapon | 5 to 10 lb. per A. | Spring after 4 to 6 in. growth. | Cultivate after 2 to 3 weeks. |
| | Atrazine | 2 lb. per A. spring plus 2 lb. per A. planting time | Apply 2 lb. per A. early spring and an additional 2 lb. per A. at planting time | Plant only corn year of application and year following treatment. |
| Patches | Dalapon | 20 to 25 lb. per A. | Grass 4 to 10 inches high | Use where cultivation after treatment is not possible. There will be a residual effect. |
| | Amitrole-T | 4 to 8 lb. per A. | Actively growing | Cultivate after 3 weeks. |
| WEEDS IN NATIVE OR CULTIVATED PASTURES[4] | 2,4-D low volatile ester | 1 to 2 lb. per A. | In early June when weeds are young and actively growing | Use 1 lb. per A. on annuals and gumweed and 2 lb. per A. on sages and other perennials. Retreat following year if necessary. |
| AROUND BLDGS., TELEPHONE POLES, ETC. | Monuron, atrazine, bromacil or similar products | See label | Anytime--all weeds | Use heavy rates for complete longtime soil sterility. |

1/ Several soil sterilants will do a very good job of perennial weed control. Follow directions of the manufacturer as they appear on the label.

2/ A spreader sticker must be used for effective control.

3/ Picloram plus 2,4-D at 1 gallon per A. or dicamba 5 to 8 lb. per A. also can be used for sowthistle and Russian knapweed control.

4/ Legumes in pastures will be killed or severely injured by 2,4-D.

## GLOSSARY OF CHEMICAL NAMES

| COMMON NAME | CHEMICAL NAME | TRADE NAME 1/ AND MANUFACTURER |
|---|---|---|
| Amiben | 3-amino-2,5-dichlorobenzoic acid | Amiben (Amchem Products) |
| Amitrole | 3-amino-1,2,4-triazole | Amino Triazole Weed Killer (American Cyanamid)<br>Weedazol (Amchem Products) |
| Amitrole-T | 3-amino-1,2,4 triazole-ammonium thiocyanate | Amitrol-T (Amchem Products)<br>Cytrol (American Cyanamid) |
| AMS | Ammonium sulfamate | Ammate X (DuPont) |
| Atrazine | 2-chloro-4-ethylamino-6-iso-propylamino-s-triazine | Atrazine 80W (Geigy) |
| Barban | 4-chloro-2-butynyl N-(3 chlorophenyl carbamate) | Carbyne (Gulf Oil Corp.) |
| Bromacil | 5-bromo-3-sec-butyl-6-methyluracil | Hyvar X (DuPont) |
| Bromoxynil | 3,5-dibromo-4-hydroxybenzonitrile | Buctril (Chipman)<br>Brominal (Amchem) |
| CDAA | 2-chloro-N,N-diallylacetamide | Randox (Monsanto) |
| Chloroxuron | (3-/p-(p-chlorophenoxy) phenyl/ 1,1-dimethylurea | Tenoran (Ciba) |
| Dalapon | 2,2-dichloropropionic acid | Dowpon (Dow) |
| Diallate | 2,3-dichlorallyl diisopropyl thiolcarbamate | Avadex (Monsanto) |
| Dicamba | 2 methoxy-3,6-dichlorobenzoic acid | Banvel D (Velsicol) |
| Dicamba-MCPA Mixture | 2 methoxy-3,6-dichlorobenzoic acid-2 methyl-4-chloro-phenoxyacetic acid mixture | Banvel M (Velsicol) |
| Endothall | Disoduim 3,6-endoxohexahydro-phthalate | Endothal, Aquathal (Pennsalt) |
| EPTC | Ethyl N,N-di-n-propyl-thiolcarbamate | Eptam (Stauffer) |
| Linuron | 3-(3,4-dichlorophenyl)-1-methoxy-1-methylurea | Lorox (DuPont) |
| MCPA | 2 methyl-4-chlorophenoxyacetic acid (amine salts and esters) | Amine salts--Various<br>Ester--Various |
| Monuron | 3-(p-chlorophenyl)-1,1-dimethylurea | Telvar (DuPont) |
| Picloram-2,4-D Mixture | 4-amine-3, 5, 6-trichloropicolinic acid-2,4-D mixture | Tordon 212 Mixture (Dow) |
| Propachlor | 2-chloro-N-isopropylacet-anilide | Ramrod (Monsanto) |
| Propazine | 2-chloro-4,6-bis(isopropyl-amino)-s-triazine | Propazine 80W (Geigy) |
| TBA | 2,3,6-trichlorobenzoic acid | Various |
| TBA -Sodium borate mixture | Sodium borate-2,3,6-TBA mixture | Benzabor (U. S. Borax) |
| TCA | Sodium trichloroacetate | Various |
| Triallate | 2,3,3-trichloroallyl diisopropylthiolcarbamate | Far-go (Monsanto) |
| Trifluralin | 2,6-dinitro-N,N-di-n-propyl-a,a,a-trifluoro-p-toluidine | Treflan (Elanco Products) |
| 2,4-D | 2,4-dichlorophenoxyacetic acid (sodium and amine salts and esters) | Various |
| 2,4-DB | 4-(2,4-dichlorophenoxy) butyric acid (amine salts and esters) | Butyrac 118 (Amchem Products)<br>Butoxone (Chipman) |

1/ The mention of trade names does not imply that they are endorsed or recommended over those of similar nature not listed.

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