

South Dakota State University

Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange

SDSU Extension Fact Sheets

SDSU Extension

1987

Weed Control in Small Grain and Flax : 1987

Leon J. Wrage

W. E. Arnold

Paul O. Johnson

Follow this and additional works at: https://openprairie.sdstate.edu/extension_fact

Recommended Citation

Wrage, Leon J.; Arnold, W. E.; and Johnson, Paul O., "Weed Control in Small Grain and Flax : 1987" (1987). *SDSU Extension Fact Sheets*. 1352.

https://openprairie.sdstate.edu/extension_fact/1352

This Fact Sheet is brought to you for free and open access by the SDSU Extension at Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. It has been accepted for inclusion in SDSU Extension Fact Sheets by an authorized administrator of Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. For more information, please contact michael.biondo@sdstate.edu.

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.



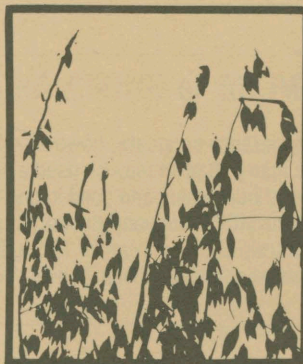
For current policies and practices, contact SDSU Extension

Website: extension.sdstate.edu

Phone: 605-688-4792

Email: sdsu.extension@sdstate.edu

SDSU Extension is an equal opportunity provider and employer in accordance with the nondiscrimination policies of South Dakota State University, the South Dakota Board of Regents and the United States Department of Agriculture.



FS 525A

Weed Control in Small Grain and Flax: 1987

Cooperative Extension Service • South Dakota State University • U.S. Department of Agriculture

Leon J. Wrage, Extension agronomist, weeds
W. E. Arnold, professor of plant science
Paul O. Johnson, Extension IPM coordinator

Herbicides are a valuable supplement to and not a replacement for good rotations, clean seed, proper seedbed preparation, tillage, and crop competition.

Herbicide Suggestions

Information in this publication is based on research by the South Dakota Agricultural Experiment Station and other research or observations. Herbicides are included only after the chemical is registered by the Environmental Protection Agency (EPA) as to residue tolerances in crops used for food or feed.

This information provides a summary of herbicide uses and does not imply a guarantee. Tradenames are used for reader convenience and do not imply product endorsement. The label should be considered the final guide. Users are responsible for following label directions and precautions.

Weed Problems. Herbicide control is rated poor, fair, good, very good, or excellent for each weed problem in each crop.

Special Weed Problems. One section lists the best treatment for specific broadleaved weeds.

Herbicides. Most herbicides are listed by tradename except where the active ingredient is available in several products. The common name (in parentheses) follows the first listing of the tradename.

Rates. Rates for each treatment and each formulation are stated as the amount of product per acre. The amount of active ingredient or acid equivalent (act) per acre is stated for each formulation in parentheses.

Time To Apply. The best time to apply most treatments is based on crop and/or weed growth stage. Some herbicides are applied preemergence (after planting but before weeds or crop emerge). Some must be incorporated. Others are applied preplant incorporated (before planting).

FOLLOW THE LABEL

Federal regulations make it unlawful for any person to use an herbicide in a manner inconsistent with its labeling. This includes the kind of crop and weed; rate, carrier and other application directions; storage, disposal, and protective clothing; or other precautions stated.

Abbreviations Used

pt = pint
qt = quart
gal = gallon
fl oz = fluid ounce
oz = ounce
lb = pound
act = actual or acid equivalent
lb/gal = pound per gallon active
df = dry flowable (spray)
gran = granule
wsp = water soluble powder
wdg = water dispersible granule

OATS (not underseeded to legumes)

MCPA AMINE or MCPA ESTER

1/2-1 pt MCPA amine-4 lb/gal or 1/2-2/3 pt MCPA ester-4 lb/gal (1/4-1/2 or 1/4-1/3 act)

SOME BROADLEAVES

Apply at 3- to 4-leaf stage of crop. At other growth stages, crop is more tolerant to the treatment than to other treatments. Crop least tolerant at boot to heading. Weeds must be small. MCPA is equal to 2,4-D on wild mustard, lambsquarters, and Canada thistle. MCPA is less effective than 2,4-D on larger broadleaved weeds. Poor control of kochia and wild buckwheat. Most situations require 2/3 to 1 pt/A. Do not graze dairy or slaughter animals on treated areas for 2 weeks after treatment.

2,4-D AMINE

1/2-2/3 pt 2,4-D amine-3.8 lb/gal (1/4-1/3 act)

BROADLEAVES

Apply at 3- to 4-leaf stage of crop. Do not apply at boot to heading. Less crop tolerance than to MCPA. Oat varieties vary in tolerance to 2,4-D. Very good control of several annual broadleaves. Weak on wild buckwheat and kochia. Use higher rate for larger weeds or for perennials, but risk of crop injury increases. Do not graze dairy or slaughter animals on treated areas for 2 weeks after application.

Harvest aid application of 1 lb/A acid equiv may be made after the dough stage. Straw should not be used for feed.

BANVEL + MCPA AMINE (DICAMBA + MCPA)*1/8-1/4 pt Banvel-4 lb/gal + 1/2-3/4 pt MCPA-4 lb/gal (1/16-1/8 + 1/4-3/8 act)***WILD BUCKWHEAT,
SEVERAL ANNUAL
BROADLEAVES**

Tank-mix. Apply at 3- to 4-leaf stage of crop. Do not apply after the 4-leaf stage. Crop tolerance adequate; however growth stage range is narrow. Applications after recommended growth stage frequently cause injury. Banvel may be used alone at 1/4 pt/A; however it is usually used in combination with MCPA. Banvel gives excellent wild buckwheat and good kochia control. MCPA improves control of wild mustard. Rates of 1/8 to 1/6 pt Banvel plus 1/2 pt MCPA frequently used for small susceptible weeds and best crop tolerance. Use high Banvel rate for best kochia control. Minimum carrier is 5 gpa for ground and 3 gpa for air. Special 24(c) labeling allows minimum of 1 gpa carrier for aerial application with Banvel. Do not graze or harvest forage for livestock feed prior to crop maturity.

BUCTRIL or ME4 BROMINAL (BROMOXYNIL)*1-1 1/2 pt Buctril-2 lb/gal or 1/2-1 pt ME4 Brominal-4 lb/gal (1/4-1/2 act)***WILD BUCKWHEAT,
SUNFLOWER,
SOME ANNUAL
BROADLEAVES**

Apply at 2-leaf to early boot stage of crop. Fair crop tolerance. Risk of leaf burn under hot, humid conditions. Use lower rates for maximum crop safety. Rate of 1 1/2 pt Buctril or 3/4 pt ME4 Brominal suggested for most situations. Primarily where wild buckwheat is the major problem. Weeds should not be past the 3- to 4-leaf stage for best results. Not effective on perennials. Most frequently used with MCPA for broadspectrum weed control. Contact action. Good coverage required. Minimum carrier is 10 gpa for ground and 2 gpa for ME4 Brominal or 5 gpa for Buctril with aerial application. Do not graze treated areas for 30 days following application.

BUCTRIL or ME4 BROMINAL + MCPA (BROMOXYNIL + MCPA)**BRONATE or 3+3 BROMINAL***1-1 1/2 pt Buctril-2 lb/gal or 1/2-3/4 pt ME4 Brominal-4 lb/gal + 1/2-1 pt MCPA-4 lb/gal (1/4-3/8 + 1/4-1/2 act)**1-1 1/2 pt Bronate or 2/3-1 pt 3+3 Brominal (1/4-1/2 + 1/4-3/8 act)***WILD BUCKWHEAT,
SUNFLOWER,
KOCHIA, SEVERAL
ANNUAL BROADLEAVES**

Tank-mix or commercial premix. Bronate contains 2 lb/gal acid equiv each of bromoxynil and MCPA ester and 3+3 Brominal contains 3 lb/gal acid equiv of each. Apply at the 3- to 4-leaf to early boot stage. Lower rates preferred for best crop safety. Very important to treat weeds when small. Excellent wild buckwheat and good kochia control. Very good control of several other annual broadleaves. Not for perennials. Low rate is for small weeds. Crop safety has been adequate in most tests. Leaf burn noted, especially under hot, humid conditions. Do not apply just before heavy frost. Good coverage required. Minimum carrier is 10 gpa for ground and 2 gpa for 3+3 Brominal or 5 gpa for Bronate applied by air. Do not graze treated areas for 30 days after application.

TORDON 22K + MCPA AMINE (PICLORAM + MCPA)*1 fl oz Tordon 22K-2 lb/gal + 1/2-3/4 pt MCPA amine-4 lb/gal (1/64 + 1/4-3/8 act)***WILD BUCKWHEAT,
SOME ANNUAL
BROADLEAVES**

Tank-mix. Apply at 3- to 5-leaf stage of crop when weeds are small. Excellent on wild buckwheat. Also controls some annual broadleaves such as mustard and lambsquarters. Poor kochia control. Used primarily where wild buckwheat is the major problem. Good crop tolerance. Do not plant susceptible broadleaved crops such as alfalfa, sunflowers, or soybeans the following year. Minimum carrier is 5 gpa for ground and 1 gpa for air. Consult label for all application directions and restrictions. Special Local Needs state registration. Restricted Use pesticide. Crop use restrictions as for MCPA alone.

GLEAN (CHLORSULFURON)*1/6-1/2 oz Glean 75df (.007-.02 act)***FOXTAIL,
SEVERAL
ANNUAL
BROADLEAVES**

Glean controls several annual weeds and provides extended weed control after harvest. Apply at 2- to 3-leaf stage of crop. Weeds should be small and actively growing. Rainfall after application improves results. Do not apply before crop emergence. Wild mustard, pigweed, and lambsquarters are most susceptible and can be controlled with 1/6 to 1/3 oz/A product. Russian thistle, wild buckwheat, kochia, and foxtail are more difficult to control and require 1/3 to 1/2 oz/A product. Add surfactant at 1 to 2 qt/100 gallons of solution. Crop tolerance is good. Do not apply if soil pH over 7.5. Do not exceed 1/3 oz/A product on soil with pH 6.6 to 7.5. Minimum carrier is 3 gpa for ground and 1 gpa for air.

Treated fields may be planted to wheat, barley, or oats the following year under most situations. Refer to Glean in wheat, barley section for additional precautions and crop rotation limitations.

MODOWN (BIFENOX)*1 1/2-2 pt Modown-4 lb/gal (3/4-1 act)***FOXTAIL, FEW
ANNUAL
BROADLEAVES**

Apply at 2- to 4-leaf stage and before weed seedlings emerge. Weeds are controlled as shoot comes in contact with herbicide zone during emergence. Does not control emerged weeds. Some crop leaf burn may be noted. Good foxtail control. Only option for oats. Also controls wild mustard and pigweed, fair wild buckwheat control in some SDSU tests. Use high rate for high weed densities. Minimum carrier is 20 gpa for ground or 10 gpa for air. Do not graze green forage.

WHEAT, RYE, BARLEY

(not underseeded to legumes)

MCPA AMINE or MCPA ESTER

1/2-1 pt MCPA amine-4 lb/gal or 1/2-1 pt MCPA ester-4 lb/gal (1/4-1/2 act)

SOME BROADLEAVES

Selective, translocated herbicides for several annual broadleaves. Appear to be as effective as 2,4-D on wild mustard, lambsquarters and Canada thistle. Weeds must be small; early spraying is important. Less effective than 2,4-D on larger weeds. Kochia and wild buckwheat control usually unsatisfactory. Excellent crop tolerance. Less risk of injury than for other herbicides if applied at sensitive crop growth stages. Avoid spraying at boot to heading. Most situations require 2/3 to 1 pt/A. Ester or amine formulations usually used at the same rate. Ester forms have appeared slightly more effective on more species. Apply by air or ground. Do not graze dairy or slaughter animals on treated areas for 2 weeks after treatment.

WINTER WHEAT, RYE. Apply in the spring after tillering but before early boot. MCPA is not widely used on winter grains because other treatments frequently give better control of weed problems.

HARD RED SPRING WHEAT, DURUM, BARLEY. Apply from the 5-leaf to early boot stage. Used because of excellent crop tolerance at a wide range of stages. Frequently used in combination treatments.

2,4-D AMINE or 2,4-D ESTER

1/2-1 pt 2,4-D amine-3.8 lb/gal or 1/2-1 pt 2,4-D ester-3.8 lb/gal or 1/3-2/3 pt 2,4-D ester-5.7 lb/gal (1/4-1/2 act)

BROADLEAVES

Selective, translocated herbicide for several annual and perennial broadleaved weeds. Best choice for field bindweed or Canada thistle in many situations. Very good control of several annual broadleaves but less effective for kochia or wild buckwheat. Good crop tolerance at proper growth stage. Avoid treating at boot to heading. Better crop tolerance with amine. Ester usually used at slightly lower rate than amine. Rates of 1/3 lb/A acid equiv ester or 1/2 lb/A acid equiv amine have been satisfactory for most general broadleaved problems. Rate of 1/4 lb/A acid equiv will control small susceptible weeds such as wild mustard. Use maximum rate for perennials. Some labels allow rates to 3/4 lb/A acid equiv for improved perennial control if some crop injury can be tolerated. Apply by air or ground. Do not graze dairy or slaughter animals on treated areas for 2 weeks after application.

WINTER WHEAT, RYE. Apply in the spring when crop is fully tillered until early boot. Do not apply in the fall.

HARD RED SPRING WHEAT, DURUM, BARLEY. Apply from the 5-leaf to early boot stage after crop has tillered. Earlier treatment may reduce number of tillers.

BANVEL + MCPA or 2,4-D (DICAMBA + MCPA or 2,4-D)

WEEDMASTER

1/8-1/4 pt Banvel-4 lb/gal + 1/2-3/4 pt MCPA -4 lb/gal or 2,4-D-3.8 lb gal (1/16-1/8 + 1/4-3/8 act)
3/4-1 pt Weedmaster-1 + 2.8 lb/gal

Tank-mix. Weedmaster commercial premix contains 1 lb dicamba + 2.8 lb 2,4-D amine per gallon. Weedmaster is labeled for wheat only. Excellent broadleaved weed control, including wild buckwheat and kochia. Banvel may be used alone; however it is usually combined with MCPA or 2,4-D to improve control of several other broadleaved weeds. Application time usually too early for maximum perennial control. Crop stage is critical. Late applications may cause injury. Lower rates improve crop tolerance and may be adequate if conditions are favorable; however, even lower rates should not be applied past recommended crop stages. Rate of 1/6 pt Banvel + 1/2 pt MCPA or 2,4-D amine suggested for most situations. Use lower rates for small susceptible weeds under favorable growing conditions. Use higher Banvel rates for best kochia control. Weedmaster at 3/4 pt provides 1/12 lb dicamba and 5/16 lb 2,4-D amine. MCPA in the combination gives best crop safety. Amine form of MCPA or 2,4-D preferred; ester forms not recommended. Minimum carrier is 5 gpa for ground and 3 gpa for air. Special 24(c) labeling allows minimum of 1 gpa carrier for aerial application with Banvel. Do not graze or harvest forage for livestock feed prior to crop maturity.

WINTER WHEAT. Apply in the spring before jointing stage of crop. Primarily for severe kochia. Wild buckwheat and other weeds frequently not emerged at proper time to spray. Not for rye.

HARD RED SPRING WHEAT, DURUM. Apply at the 3- to 4-leaf crop stage for best tolerance. Do not apply if the crop exceeds the 5-leaf stage. Durum may be slightly less tolerant than hard red spring.

BARLEY. Tank-mix only. Label suggests 1/8 to 3/16 pt Banvel plus 1/2 pt MCPA per acre at the 2- to 3-leaf crop stage. Marginal crop tolerance. Applications in barley frequently result in excessive injury when applied after the 3-leaf stage. Other alternatives provide greater crop tolerance if weeds are not emerged or spraying is delayed.

WHEAT, RYE, BARLEY (continued)

BUCTRIL or ME4 BROMINAL (BROMOXYNIL)

1-2 pt Buctril-2 lb/gal or 1/2-1 pt ME4 Brominal-4 lb/gal (1/4-1/2 act)

WILD BUCKWHEAT, SUNFLOWER, SOME ANNUAL BROADLEAVES

Contact herbicide for several annual broadleaved weeds. Excellent wild buckwheat control. Usually used in combination with MCPA or 2,4-D to improve control of several broadleaves. Not effective on perennials. Very good crop tolerance at a wide range of growth stages. Weeds must be small. Rate of 1 1/2 pt Buctril or 3/4 pt ME4 Brominal per acre suggested for most situations. Higher rate for larger weeds. Minimum carrier is 10 gpa for ground and 2 gpa for ME4 Brominal or 5 gpa for Buctril with aerial application. Do not graze treated areas for 30 days following application.

WINTER WHEAT, RYE. Usually applied in spring before crop has reached boot stage. May be applied in fall for winter annuals. Buctril rate is 1 1/2 to 2 pt/A.

HARD RED SPRING WHEAT, DURUM, BARLEY. Apply at 2-leaf to early boot stage of crop. Buctril rate is 1 to 1 1/2 pt/A.

BUCTRIL or ME4 BROMINAL + MCPA or 2,4-D (BROMOXYNIL + MCPA or 2,4-D) BRONATE or 3+3 BROMINAL

1-2 pt Buctril-2 lb/gal or 1/2-3/4 pt ME4 Brominal-4 lb/gal + 1/2-1 pt MCPA -4 lb/gal or 2,4-D-3.8 lb/gal

1-2 pt Bronate or 2/3-1 pt 3+3 Brominal

(1/4-1/2 + 1/4-1/2 act)

WILD BUCKWHEAT, SUNFLOWER, SEVERAL ANNUAL BROADLEAVES

Tank-mix or commercial premix. Bronate contains 2 lb/gal acid equiv each of bromoxynil and MCPA ester and 3+3 Brominal contains 3 lb/gal acid equiv of each. Broad-spectrum annual broadleaved control. Excellent wild buckwheat and good kochia control. Not for perennials. Weeds should be in the 1- to 4-leaf stage. Control of large weeds is less satisfactory. Very good crop tolerance at a wide range of growth stages. Rate of 1/4 (bromoxynil) + 1/4 (MCPA or 2,4-D) lb/A acid equiv has been satisfactory for small weeds under favorable growing conditions. Use 3/8 lb/A acid equiv of each for larger weeds or less favorable conditions. Use high rates of MCPA or 2,4-D for best perennial weed control. An additional 1/4 lb/A acid equiv MCPA may be added to the rates listed in the combination. MCPA preferred for the tank-mix for best crop safety or for spraying at early crop leaf stages. Ester formulations suggested. Avoid treating prior to heavy frost. Good coverage important. Minimum carrier is 10 gpa for ground and 2 gpa for Brominal or 5 gpa for Bronate applied by air. Do not graze treated areas for 30 days after application.

WINTER WHEAT, RYE. Apply in spring after tillering to early boot crop stage. Buctril rate is 1 1/2 to 2 pt/A.

HARD RED SPRING WHEAT, DURUM, BARLEY. Apply at the 3- to 4-leaf to early boot crop stage. Buctril rate is 1 to 1 1/2 pt/A.

BANVEL + BUCTRIL or ME4 BROMINAL (DICAMBA + BROMOXYNIL)

BANVEL + BRONATE or 3+3 BROMINAL (DICAMBA + BROMOXYNIL + MCPA)

1/16-1/4 pt Banvel-4 lb/gal + 1-1 1/2 pt Buctril-2 lb/gal or 1/2-3/4 pt ME4 Brominal-4 lb/gal (1/32-1/8 + 1/4-3/8 act)

1/8-1/4 pt Banvel + 3/4-1 1/2 pt Bronate or 2/3-1 1/3 pt 3+3 Brominal (1/16-1/8 + 3/16-3/8 act)

MOST ANNUAL BROADLEAVES

Tank-mix. Excellent control of kochia, wild buckwheat, and other annual broadleaves. Adequate crop tolerance if applied at proper stage. Limited data. Lower Banvel rate improves crop tolerance. Maximum of 1/6 pt Banvel suggested for most situations. Rate of 1/16 pt included on the ME4 Brominal label. Lower rates may provide sufficient activity; especially with the higher bromoxynil rate and with the bromoxynil + MCPA combinations. Use higher bromoxynil rate for larger weeds. Apply as for Buctril or ME4 Brominal alone.

WINTER WHEAT. Apply in spring before jointing. Includes all combinations.

HARD RED SPRING WHEAT. Apply at the 2- to 4-leaf crop stage. Includes Banvel + ME4 Brominal or Buctril and Banvel + 3+3 Brominal.

TORDON 22K + MCPA or 2,4-D (PICLORAM + MCPA or 2,4-D)

1-1 1/2 fl oz Tordon 22K-2 lb/gal + 1/2-3/4 pt MCPA-4 lb/gal or 2,4-D-3.8 lb/gal (1/64-1/48 + 1/4-3/8 act)

WILD BUCKWHEAT, SOME ANNUAL BROADLEAVES

Tank-mix. Selective, translocated herbicide for annual broadleaves. Used primarily where wild buckwheat is the major problem. MCPA or 2,4-D improves control of other broadleaves. Poor kochia control. Acceptable crop tolerance. Avoid late spraying. Low rates are for small weeds under favorable conditions. MCPA amine or ester or 2,4-D amine in the tank-mix appears to offer better crop tolerance than with 2,4-D ester. Use proportionately less 2,4-D for 5.7 lb/gal product. Do not plant susceptible broadleaved crops such as alfalfa, sunflowers, or soybeans the following year. Minimum carrier is 5 gpa for ground or 1 gpa for air. Consult label for all application directions and precautions. Special Local Needs state registration. Restricted Use pesticide.

WINTER WHEAT. Apply in spring after tillering to early boot. Not for rye.

HARD RED SPRING WHEAT, BARLEY. Apply at the 3- to 5-leaf crop stage. Not for durum.

WHEAT, RYE, BARLEY (continued)

STAMPEDE + MCPA ESTER (PROPANIL + MCPA)

3 pt Stampede-3 lb/gal + 1/2 pt MCPA ester-4 lb/gal (1.1 + 1/4 act)

FOXTAIL, SOME ANNUAL BROADLEAVES

Tank-mix. Foxtail control has been variable but satisfactory under good growing conditions. Results are poor when plants are under drought stress. Do not apply beyond recommended weed stage. Provides good control of pigweed, wild buckwheat, and lambsquarters; fair on kochia. Considerable crop yellowing and leaf burn; however crop usually recovers if conditions are favorable. Durum and barley less tolerant than hard red spring wheat. Do not use in fields treated with organophosphate insecticide. Minimum carrier is 10 gpa for ground or 5 gpa for air.

HARD RED SPRING WHEAT. Apply 3 pt Stampede + 1/2 pt MCPA ester per acre when foxtail is at the 2- to 3-leaf stage. Wheat is usually at the 3- to 5-leaf stage. Stampede alone at 4 pt/A may be used for foxtail at the 3- to 4-leaf stage. Do not apply after foxtail is beyond the 4-leaf stage or after crop is beyond the 5-leaf stage.

DURUM, BARLEY. Apply 3 pt Stampede + 1/2 pt MCPA ester when foxtail is at the 2- to 3-leaf stage. Durum and barley should not be treated after the 4-leaf crop stage.

TREFLAN (TRIFLURALIN)

1-1 1/2 pt Treflan-4 lb/gal or 5-7 1/2 lb Treflan 10% gran (1/2-3/4 act)

FOXTAIL

Spring Application After Planting, Shallow Incorporated. Liquid formulation. Incorporate 1 to 1 1/2 inches deep with two flex-tine or spike-tooth harrowings. Immediate incorporation preferred but may be delayed up to 24 hours if soil surface is dry and there is little wind. Excessive residue should be incorporated before planting. Seed must be planted 2 to 3 inches deep so it is below the treated soil layer. Use the low rate on light, low organic matter soil and the high rate on heavy, clay soil. The 1 1/4 pt/A rate has been satisfactory in most SDSU tests. Foxtail control has been very consistent, except with extremely dry topsoil. Does not control wild oats. Very good crop tolerance if seed planted below treated soil. Better crop tolerance than fall incorporated application. Minimum carrier is 5 gpa. Do not plant oats or sorghum the following year. Preferred application method for most situations.

Fall Applied Preplant Incorporated. Granules preferred. Apply after September 1. Crop residues should be worked to a manageable level before application. Granules may be applied into standing stubble. Incorporate one time within 24 hours. The second incorporation should be in the spring before planting. A chisel (three rows of narrow spaced sweeps) set 4 to 5 inches deep, tandem disk set 3 to 4 inches deep or field cultivator may be used for the initial pass. A disk or field cultivator should be used for the second pass. Very consistent foxtail control. Weed control will be more consistent under dry conditions. For spring wheat, use the low rate for light and medium textured soil and the high rate for heavy, clay soil. For barley, use the low rate for light soil and the high rate for medium and heavy soil. Crop tolerance may be adequate; however some stand reduction may be noted in certain conditions. Spring post-plant application preferred for most situations. Application directions and precautions same as for spring application.

HARD RED SPRING WHEAT, DURUM, BARLEY. Apply liquid in spring after planting and incorporate shallowly or apply in the fall and incorporate. Apply granules in fall and incorporate. Not for winter wheat or rye.

GLEAN + BANVEL (CHLORSULFURON + DICAMBA)

GLEAN + BUCTRIL or ME4 BROMINAL (CHLORSULFURON + BROMOXYNIL)

GLEAN + BRONATE or 3+3 BROMINAL (CHLORSULFURON + BROMOXYNIL + MCPA)

1/6-1/2 oz Glean-75df + 1/8-1/4 pt Banvel-4 lb/gal (.007-.02 + 1/16-1/8 act)

1/8-1/3 oz Glean-75df + 3/4-1 1/2 pt Buctril-2 lb/gal or 3/8-1 pt ME4 Brominal-4 lb/gal (.006-.016 + 3/16-1/2 act)

1/8-1/3 oz Glean-75df + 3/4-1 1/2 pt Bronate or 1/2-1 pt 3+3 Brominal (.006-.016 + 3/16-3/8 + 3/16-3/8 lb act)

FOXTAIL, MOST ANNUAL BROADLEAVES

Tank-mix. Glean controls several annual broadleaved weeds and provides residual control. **Combination with Banvel** provides additional control of broadleaved weeds, especially if kochia, wild buckwheat, or other emerged weeds are larger than desired for control with Glean. Very low rates may not be satisfactory if weeds are large. Do not exceed maximum crop stage for Banvel alone. **Combination with Buctril or ME4 Brominal** provides additional control of emerged weeds, including kochia and wild buckwheat. **Combination with Bronate or 3+3 Brominal** includes MCPA ester and bromoxynil. Fits best if emerged broadleaves such as lambsquarters or Russian thistle require a translocated herbicide in the combination.

WINTER WHEAT, HARD RED SPRING WHEAT. Apply postemergence to crop when weeds are less than 2 inches tall. Maximum Banvel rate is 3/16 pt for barley. Glean + 3+3 Brominal is for winter wheat only.

MODOWN (BIFENOX)*1½-2 pt Modown-4F (¾-1 act)***FOXTAIL,
SOME ANNUAL
BROADLEAVES**

Selective, postemergence (crop) herbicide. Controls weeds as the emerging shoot comes in contact with herbicide zone. Does not control emerged weeds. Crop leaf burn may be noted. Good foxtail control; also controls annual broadleaves such as wild mustard and pigweed. Minimum carrier is 20 gpa for ground or 10 gpa for air. Do not graze green forage. Appears to have limited potential when compared to other options for these crops.

WHEAT, BARLEY. Apply at the 2- to 4-leaf stage of crop but before weeds emerge.

GLEAN (CHLORSULFURON)*1/6-½ oz Glean 75%df (.007-.02 act)***FOXTAILS AND
SEVERAL ANNUAL
BROADLEAVES**

Glean controls several annual weeds in wheat and barley. It has residual properties that extend weed control after harvest or into fallow. Use rates are very low. Wild mustard, pennycress, pigweed, and lambsquarters are most susceptible and can be controlled with 1/6 to 1/3 oz/A product. Russian thistle, wild buckwheat, kochia, and foxtail are suppressed and require ½ to ½ oz/A product. Fall application gives most consistent results on these weeds in wheat. Early postemergence gives best control with spring application. Wild oat and downy brome are not controlled. Weed control has been excellent to very good in most situations. Some rainfall soon after application improves performance. Excellent wheat tolerance to spring application. Barley is less tolerant than wheat. Crop injury can result from treatments when crop is under stress. Heavy rainfall soon after application may cause temporary discoloration. Soil pH is also used to determine rate.

Soil carryover increases under high soil pH (over 7.0), low rainfall (under 20 inches), cool soil temperature (under 40°F), and with high rates. Small quantities of Glean remaining in the soil can injure crops other than wheat, barley, or oats for 2 years or longer at soil pH 6.5 or lower, and up to 3 years or longer for pH 6.6 to 7.5. On soils over pH 7.0, a 4-year interval may be required for sensitive crops. The season before planting crops other than wheat, barley, or oats, a test strip of the crop to be planted must be grown to maturity. An untreated check strip, also planted to the test crop, will improve ability to evaluate carryover.

Wheat or barley may be planted into treated areas according to the following intervals (given in months):

Soil pH	Under 6.5	Under 6.5	6.6-7.5	Over 7.5
Rate Used	1/6-1/3 oz	1/2 oz	1/6-1/3 oz	
Wheat	0	4	0	DO
Barley	10	10	16	NOT
Oats	10	10	10	USE

Do not apply Glean on soils with pH over 7.5. Do not exceed ⅓ oz/A product on soil with pH 6.5 to 7.5. Avoid swath overlap or drift. Use extra care to clean tank, line, and boom as small quantities can injure susceptible crops. Flush hoses and boom for 10 minutes, then add ½ gal chlorine bleach per 100 gallons of water. Flush equipment, operate sprayer system for 15 minutes. Repeat the flush operation and drain. Remove screens and nozzles. Do not use bleach with ammonia. Minimum carrier is 3 gpa for ground or 1 gpa for air.

WINTER WHEAT, HARD RED SPRING WHEAT, DURUM, BARLEY. *Postemergence to Crop.* Apply 1/6 to ½ oz/A when weeds are less than 2 inches tall or 2 inches in diameter. Apply after crop is in the 2- to 3-leaf stage, but before boot stage. A surfactant such as X-77 at 1 qt/100 gallons of solution is suggested, especially for foxtail, kochia, and wild buckwheat. Has been the best program for weed control in the crop. Good crop tolerance. The high rate usually gives some weed control in the stubble.

WINTER WHEAT, HARD RED SPRING WHEAT, DURUM. *Preemergence.* Apply 1/6 to ⅓ oz/A after planting but before crop emerges. Rainfall within 2 weeks is required.

HARD RED SPRING WHEAT, DURUM. *Fall Application.* Apply ⅓ oz/A in the fall in stubble or on tilled ground. Tillage after application must be shallow and uniform.

WINTER WHEAT, HARD RED SPRING WHEAT, DURUM. *Split Treatment.* For soils with less than 6.5 pH. Plant crop at least 1 inch deep. Apply ¼ oz/A or less each time, preemergence, postemergence, or late postemergence. Allow 30 days between applications. Do not apply after boot stage. Not widely used.

FALLOW. Refer to No-Till section.

WHEAT, RYE, BARLEY (continued)

ALLY (METSULFURON)

0.1 oz Ally-60df (0.004 act)

SEVERAL ANNUAL BROADLEAVES

Ally controls several annual broadleaves in wheat and barley. Labeled for use west of Highway 281 and in Brown County. Residual properties extend control for 1 to 6 weeks. Pennycress, pigweed, prickly lettuce, wild mustard, and volunteer sunflower are among species most susceptible. Kochia, wild buckwheat, Russian thistle, and tansy mustard are controlled or suppressed, depending on weed size and rainfall. Ally will not control wild oats or grasses. Results in field tests have been very good. Symptoms develop slowly; discoloration may not appear for 1 to 3 weeks. Crop tolerance appears adequate at recommended rates. For best results, apply after weeds have emerged but before they are 4 inches tall/across. Rainfall after application improves results. Use a surfactant that is at least 80% active as directed. Apply in minimum of 1 gpa for air or 3 gpa for ground equipment. Follow rotational guidelines. Winter or spring wheat may be planted after 1 month; durum, barley or oats after 10 months; flax, safflower, proso millet, dryland grain sorghum, corn, and sunflower after 22 months. Allow 34 months or more for other crops.

WINTER WHEAT. Postemergence in spring when weeds are small and before boot stage. Use 1 to 2 qt surfactant per 100 gal of solution.

SPRING WHEAT, BARLEY. Postemergence from 2 leaf to early boot stage when weeds are small. Use 1 to 2 pt surfactant per 100 gal of solution.

DURUM. Postemergence after durum is fully tillered but before boot stage. The use of MCPA or 2,4-D tank mix is usually suggested for durum because weeds will be larger.

Ally labeling includes general guidelines for tank-mixing with other herbicides to improve broadleaf control or to control wild oats or grasses. Apply using rates suggested for each product. Use sequential treatments if timing is not the same for both products. A tank-mix with MCPA or 2,4-D is suggested if annual broadleaves are larger or if growing conditions are unfavorable. Do not mix with Hoelon.

0.1 oz Ally-60df + 1/4 to 1/2 pt 2,4-D or MCPA-3.8 lb/gal

FAR-GO (TRIALATE)

1-1 1/4 qt Far-go-4 lb/gal or 12 1/2-15 lb Far-go-10% gran (1-1 1/4 or 1 1/4-1 1/2 act)

WILD OATS

Spring Application. Spray formulations preferred. Apply after planting and incorporate immediately into the top 2 inches of soil with two harrowings. Application and incorporation may be done before planting for barley. Excessive plant residue should be worked into the soil before application. Barley is more tolerant than wheat. Use low rate on wheat. Crop seed must be planted 2 to 3 inches deep so seed is below layer of treated soil. Wheat seed in treated soil layer will be damaged. Not suggested for disk-planted (endgate seeder) wheat. May be applied in liquid fertilizer. Minimum carrier is 10 gpa. Do not graze livestock on treated areas.

Fall Application. For wild oat control. Granules preferred. Results have been consistent. Rates of granules listed are for fall treatment. Granules should be applied within 3 weeks of soil freeze-up. Stubble fields should be worked with a field cultivator or disk before application. Incorporate granules into top 2 inches of soil within 48 hours using a field cultivator or other suitable equipment. Spring seedbed tillage must be shallow.

DOWNY BROME

Fall Application: For downy brome (cheatgrass) suppression. Apply 15 lb Far-go-10% granules per acre prior to or during planting winter wheat. The granules may be shallowly incorporated or applied to the surface when using no-till seeding equipment. Limited tests. Will be evaluated in research and field tests during 1987.

HARD RED SPRING WHEAT, DURUM, BARLEY. Apply in spring or fall as shown above.

TREFLAN + FAR-GO (TRIFLURALIN + TRIALLATE)

1-1 1/2 pt Treflan-4 lb/gal + 1-1 1/4 qt Far-go-4 lb/gal (1/2-3/4 + 1-1 1/4 act)

FOXTAIL, WILD OATS

Tank-mix. Spring applications only. Apply after planting and incorporate as for Far-go alone. Adjust rates for soil type. Consistent control. Rates of 1 pt/A Treflan + 1 qt/A Far-go per acre have been satisfactory in most SDSU tests. Maximum Far-go rate for barley is 1 qt/A. Refer to application directions and precautions for each product used alone. Do not mix granules or liquid for fall application. Unless the wild oat problem is very spotty, consider applying Far-go granules in the fall and Treflan liquid in the spring after planting if the spring applied tank-mix is not used.

HARD RED SPRING WHEAT, DURUM, BARLEY. Apply in spring as shown above. Not for winter wheat or rye.

WHEAT, RYE, BARLEY (continued)

HOELON (DICLOFOP)

2-3 1/3 pt Hoelon-3 lb/gal (3/4-1 1/4 act)

WILD OATS, FOXTAIL

For postemergence wild oat and foxtail control. Weeds should be in the 1 to 3-leaf stage for best results. Control has been consistent when applied at the proper weed stage. Do not treat weeds larger than specified for the rate and crop. Use lowest rate only for weeds in the 1 to 2-leaf stage and when growing conditions are favorable. The 2 2/3 pt/A rate is suggested for most other situations. Adequate crop tolerance. Wheat is more tolerant than barley. Some crop leaf discoloration occurs under stress conditions. Do not tank-mix with herbicides other than those labeled, as weed control may be reduced. Do not apply herbicides other than those listed within 5 days of Hoelon application. Minimum carrier is 10 gpa for ground and 5 gpa for air. Do not graze or harvest from treated fields. Restricted Use Pesticide.

DOWNY BROME

For preplant incorporated application to control downy brome (cheatgrass) in winter wheat. New supplemental label for certain states. Weed control in some tests in other states has been satisfactory. Results from limited SDSU tests have been variable. Additional research and field scale tests are planned. Incorporate within 48 hours to a depth of 2 to 3 inches. Incorporate twice to insure uniformity. Existing crop residue should be mixed into the soil before application. Rate is 2 to 3 1/3 pt/A; use the higher rate for heavy infestations.

WINTER WHEAT. Apply postemergence in spring to control foxtail and wild oats as for spring wheat. Not for rye. Apply in the fall preplant incorporated for downy brome grass control.

HARD RED SPRING WHEAT, DURUM. Apply when foxtail or wild oats is in the 1- to 4-leaf stage. Use 2 to 2 2/3 pt/A when weeds have 1 to 3 leaves. Rates of 2 2/3 to 3 1/3 pt/A may be used when weeds have 3 to 4 leaves. Do not treat past 4-leaf stage of weeds. Crop oil concentrate at 1/2-1 pt/A for air or 1-2 pt/A for ground application may improve grass control under drought conditions. Do not use oil additive with Hoelon rates above 2 2/3 pt/A or with bromoxynil tank-mixes.

BARLEY. Apply when foxtail and wild oats are in the 1- to 3-leaf stage. Use 2 to 2 2/3 pt/A. Do not treat past the 3-leaf stage of weeds. Do not exceed 2 2/3 pt rate or use crop oil additive. Do not treat barley under cold or prolonged wet conditions.

HOELON + BUCTRIL or ME4 BROMINAL (DICLOFOP + BROMOXYNIL)

HOELON + ME4 BROMINAL or BUCTRIL + MCPA

(DICLOFOP + BROMOXYNIL + MCPA)

ONE-SHOT

HOELON + GLEAN (DICLOFOP + CHLORSULFURON)

2-3 1/2 pt Hoelon-3E + 1-2 pt Buctril-2 lb/gal or 3/4-1 pt ME4 Brominal-4 lb/gal (3/4-1 1/4 + 1/4-1/2 act)

*2 2/3-3 1/3 pt Hoelon-3E + 1/2 pt ME4 Brominal-4 lb/gal or 1 pt Buctril-2 lb/gal +
1 1/2 fl oz MCPA ester-4 lb/gal (1-1 1/4 + 1/4 + .05 act)*

1 container One-Shot/10 acres (.8 + .25 + .045 act)

2 2/3-3 1/3 pt Hoelon-3E + 1/6-1/4 oz Glean 75df (1-1 1/4 + .007-.01 act)

WILD OATS, FOXTAIL, SOME ANNUAL BROADLEAVES

Tank-mixes. Hoelon provides good to very good control of wild oats and foxtail. Combinations control annual broadleaves or provide residual control. Not for perennials. Grasses must be in proper stage for Hoelon and broadleaves must be small. Minimum carrier is 10 gpa for ground or 5 gpa for air. Do not mix with 2,4-D or use crop oil additives. **Combinations with bromoxynil** control emerged annual broadleaves, including kochia and wild buckwheat. **Combination with bromoxynil + MCPA** includes a low rate of MCPA primarily for wild mustard control. Higher rates increase risk of antagonistic reaction with Hoelon. One-Shot is a package combination of diclofop (Hoelon, Illoxon), bromoxynil, and MCPA ester (Certrol). Each container package will treat 10 acres. This is equivalent to .8 lb (2.1 pt Hoelon), 1/4 lb bromoxynil, and .045 lb actual MCPA per acre. **Combination with Glean** provides control of several small emerged annual broadleaves and gives residual control into the season. Glean rate may not provide control of less susceptible or large weeds and may not give residual control into the fall in no-till situations. Higher Glean rates increase risk of antagonistic reaction with Hoelon. Note soil and crop rotation limitations for Glean alone.

WINTER WHEAT, HARD RED SPRING WHEAT, DURUM. Refer to Hoelon alone. Not for rye. Hoelon + Glean for winter wheat only. One-Shot combination not for winter wheat.

BARLEY. Refer to Hoelon alone. Do not exceed 2 2/3 pt/A Hoelon or use under cold, prolonged wet conditions. Some risk of crop yellowing.

WHEAT, RYE, BARLEY (continued)

CARBYNE (BARBAN)

1-1½ pt Carbyne-2 lb/gal (1/4-3/8 act)

WILD OATS

For postemergence wild oat control. Apply when wild oats is in 2-leaf stage. Wild oat control is good if weed emergence is uniform. Activity is greatest at low temperatures. Use high rate for heavy populations and when temperatures are high and when soil moisture is inadequate. The addition of liquid nitrogen fertilizer as part of the carrier will improve wild oat control on soil low in nitrogen or when wild oats are under stress conditions. Add 1 gal liquid nitrogen per acre. Use agitation when mixing. Crop tolerance is improved if applied when daytime temperature will exceed 60°F and not fall below 40°F for several hours each of the first 3 days. Light frost prior to application should not increase crop injury if temperature requirements are met following application. Some durum varieties reported to be less tolerant; however, Leeds and Wells appear to be as tolerant as hard red spring wheat. Use 5 to 10 gpa carrier and 45 psi pressure and have boom on ground equipment rotated forward so spray hits weeds at a 45° angle. Use 3 to 5 gpa for aerial application. Treated fields should not be grazed.

Rescue alternatives include a single application of 2 pt/A if wild oats is in the 2½- to 3½-leaf stage or a split application using a second 1 pt/A applied 7 to 14 days after initial treatment. These are strictly rescue programs and should be considered only when crop tolerance is of little concern.

WINTER WHEAT. Not suggested for spring application on overwintered wild oats. Not for rye.

HARD RED SPRING WHEAT, DURUM, BARLEY. Higher rate suggested for semi-dwarf wheat varieties. Do not use rescue treatments on durum.

Carbyne may be tank-mixed with several other herbicides. These combinations are intended to improve wild oat, foxtail or broadleaf control, depending on the product. Refer to section for each herbicide used alone. The combinations include:

1-1½ pt Carbyne-2 lb/gal + ½-1 pt ME4 Brominal-4 lb/gal or 1-2 pt Buctril-2 lb/gal (3/8 + 1/4-1/2 act)

1 pt Carbyne-2 lb/gal + 1-2 pt Avenge-2 lb/gal (1/4 + 1/4-1/2 act)

1-1½ pt Carbyne-2 lb/gal + 1/6-1/2 oz Glean-75% df (1/4-3/8 + .007-.02 act)

1-1½ pt Carbyne-2 lb/gal + ⅔-1½ pt Hoelon-3 lb/gal (1/4-3/8 + 1/4-1/2 act)

AVENGE (DIFENZOQUAT)

2¼-4 pt Avenge-2 lb/gal (⅔-1 act)

WILD OATS

For postemergence wild oat control. The 3 pt/A is suggested for most light to moderate infestations in wheat. Apply when wild oats is in the 3- to 5-leaf stage. Wild oat is most susceptible at the 5-leaf stage. High rate is for early application and for high weed densities over 25 plants/square foot. Best results under good growing conditions. Do not apply when plants are wet or under drought stress. Minimum carrier is 5 gpa for ground and 3 gpa for air. Add surfactant for carrier volumes over 10 gpa. Do not graze or harvest forage from treated fields.

WINTER WHEAT. Limited data or experience because wild oat in winter wheat is not a widespread problem. Reports indicate adequate crop tolerance. Not for rye.

HARD RED SPRING WHEAT, DURUM, BARLEY. Use only on Butte, Olaf, Era, Kitt, Fortuna, Solar, Coteau, Walera, Probrand 711, Marshall, Wheaton, Probrand 715, Oslo, Pioneer 2369, Pondera, Apex, Buckshot, Centa, Columbus, Courtney, Erik, Glenman, Leader, McKay, Newana, Norak, Norana, Prodax, Stoa, Success, Victory. Do not treat unlabeled varieties as injury can be substantial. Labeled varieties appear to have adequate tolerance under favorable growing conditions. Durum, except Vic, Edmore, Lakota, Wacona, Westbred 803, and Wakooma, may be treated. Barley is more tolerant than spring wheat.

Wheat, Rye, Barley (continued)

AVENGE + MCPA or 2,4-D (DIFENZOQUAT + MCPA or 2,4-D)

AVENGE + ME4 BROMINAL or BUCTRIL (DIFENZOQUAT + BROMOXYNIL)

AVENGE + 3+3 BROMINAL or BRONATE (DIFENZOQUAT + BROMOXYNIL + MCPA)

AVENGE + GLEAN (DIFENZOQUAT + CHLORSULFURON)

2 1/2-4 pt Avenge-2 lb/gal + 1/2-2 pt MCPA-4 lb/gal or 1/2-1 1/2 pt 2,4-D-4 lb/gal (2/3-1 + 1/4-1 or 1/4-3/4 act)

2 1/2-4 pt Avenge-2 lb/gal + 1-2 pt Buctril-2 lb/gal or 3/4-1 pt ME4 Brominal-4 lb/gal (2/3-1 + 1/4-1/2 act)

2 1/2-4 pt Avenge-2 lb/gal + 1-2 pt Bronate or 2/3 to 1 1/3 pt 3+3 Brominal (2/3-1 + 1/4-1/2 act)

2 1/2-4 pt Avenge-2 lb/gal + 1/6-1/2 oz Glean-75% df (2/3-1 + .007-.02 act)

WILD OATS, SEVERAL BROADLEAVES

Tank-mixes. Provides good to very good control of wild oats and several broadleaved weeds. **Combination with 2,4-D** preferred for perennials. **Combination with Glean** provides control of small annual weeds and residual control where fallow, wheat, barley or oats will follow the next season. In most situations, Glean may provide better control if applied earlier when weeds are smaller. **Bromoxynil combinations** primarily for small, annual broadleaves. Follow crop use directions and variety restrictions as for Avenge alone. Some combinations have been in only limited SDSU tests, especially at higher rates. Follow rate suggestions listed for MCPA, 2,4-D, bromoxynil, or Glean alone as some rates listed in the above combinations are higher than recommended for safe use. Use minimum of 5 gpa for ground or aerial application of MCPA or 2,4-D tank-mix. Use minimum of 10 gpa for ground or 5 gpa for aerial application of bromoxynil tank-mix. Use minimum of 5 gpa for ground or 3 gpa for aerial application of Glean tank-mix.

WINTER WHEAT. Refer to Avenge section. Not for rye.

HARD RED SPRING WHEAT, DURUM, BARLEY. Refer to Avenge section and guidelines for each product. Note variety restrictions as for Avenge alone.

FLAX

MCPA AMINE or MCPA ESTER

1/2 pt MCPA amine-4 lb/gal or 1/2 pt MCPA ester-4 lb/gal (1/4 act)

FEW BROADLEAVES

Apply when flax is 2 to 6 inches tall but before buds form. Treat before weeds are 4 inches tall. Fair to good control of mustard and lambsquarters. Poor on kochia or wild buckwheat. Fair to good crop tolerance. Better crop tolerance and improved weed control when sprayed early. Usually applied in combination with Dowpon. Avoid treating during drought stress. Flax may be underseeded to alfalfa. Not labeled for preharvest application.

DOWPON (DALAPON)

1 lb Dowpon-74% wsp (3/4 act)

FOXTAIL

Apply when flax is 1 to 6 inches and foxtail is less than 2 inches tall. Less control of barnyardgrass. Usually not effective on wild oats. Treating early when weeds are small gives best results and reduces risk of crop injury. Marginal crop tolerance. Stunting may occur, especially under dry conditions. Varietal differences have been observed, but not consistently. Minimum carrier is 5 gpa for ground or air. Do not use on flax underseeded to grasses or legumes. Usually applied in combination with MCPA.

DOWPON + MCPA AMINE (DALAPON + MCPA)

1 lb Dowpon-74% wsp + 1/2 pt MCPA amine-4 lb/gal (3/4 + 1/4 act)

FOXTAILS, ANNUAL BROADLEAVES

Tank-mix. Apply when flax is 2 to 6 inches tall. Avoid late treatment to reduce injury. Crop height of 2 to 4 inches preferred. Marginal crop tolerance, especially under drought stress. Reduction of Dowpon rate improves crop safety, but usually reduces grass control. Do not use on flax underseeded to alfalfa or grasses. Refer to Dowpon and MCPA sections above.

BUCTRIL or ME4 BROMINAL (BROMOXYNIL)

1 pt Buctril-2 lb/gal or 1/2-1 pt ME4 Brominal-4 lb/gal (1/4-3/8 or 1/4-1/2 act)

**WILD BUCKWHEAT,
SUNFLOWER,
SOME ANNUAL
BROADLEAVES**

Apply when flax is 2 to 8 inches tall and weeds are in 2- to 4-leaf stage. Excellent wild buckwheat and good kochia control. Used in flax primarily for dense infestations of these weeds. Also controls several other annual broadleaves but is weak on wild mustard. Fair to good crop tolerance. Best crop tolerance when flax is small. Do not apply at bud stage or in humid weather when temperature is over 85°F. Use 1/4 to 3/8 lb/A acid equiv for most situations. More risk of crop leaf burn with higher rate. Not recommended in combination with other herbicides because of crop injury. Minimum carrier is 10 gpa for ground and 5 gpa for air. Do not use on flax underseeded to alfalfa.

TREFLAN (TRIFLURALIN)

1-2 pt Treflan-4 lb/gal or 5-10 lb Treflan-10% gran (1/2-1 act)

FOXTAIL

Apply in the fall and incorporate. Not approved for spring application. Granules preferred, especially with heavy residue. Apply after September 1. Crop residue should be worked to a manageable level before application; however granules may be applied into standing stubble. Incorporate one time within 24 hours. A chisel (three rows of narrow spaced sweeps) set 4 to 5 inches deep, tandem disk set 3 to 4 inches deep, or field cultivator may be used for the first pass. A disk or field cultivator should be used for the second pass. Make second pass at a right angle. Use low rates for light, sandy soil. Rate of 1 1/2 pt or 7 1/2 lb granules suggested for most soils. Very consistent weed control. Crop tolerance is fair; however some thinning may occur under poor emergence conditions. Slight reductions seldom affect yield. Seedbed should be firm. Delay seeding until seedbed warms. Seed with a press or hoe drill. Seed less than 1 1/2 inches deep. Minimum carrier is 5 gpa. Consult Treflan label for other precautions.

RAMROD (PROPACHLOR)

4 qt Ramrod-4 lb/gal (4 lb act)

FOXTAIL

Preemergence. Apply before weeds emerge. Gives very good to excellent control of foxtail. Does not control broadleaves. Rainfall required. Crop tolerance is adequate; some stunting at emergence may be noted under wet, cold conditions. Minimum carrier is 15 gpa. Not labeled for flax underseeded to alfalfa.

HOELON (DICLOFOP)

2-2 2/3 pt Hoelon-3 lb/gal (3/4-1 act)

**WILD OATS
FOXTAIL**

For postemergence wild oat and foxtail control. Weeds should be in the 1- to 3-leaf stage for best results. Use the high rate if weeds are in the 3- to 4-leaf stage. Avoid treating larger weeds. Control has been consistent. Drought stress reduces effectiveness. Crop tolerance appears very good. May be tank-mixed with bromoxynil; do not apply other broadleaf herbicides within 5 days of Hoelon application. The 2 2/3 pt/A rate is suggested for most situations. The low rate may be adequate for very small weeds when conditions are favorable. Minimum carrier is 10 gpa for ground and 5 gpa for air. Do not add crop oil concentrate. Do not graze or feed flax straw from treated fields. RESTRICTED USE PESTICIDE.

HOELON + ME4 BROMINAL or BUCTRIL (DICLOFOP + BROMOXYNIL)

2-2 2/3 pt Hoelon + 1/2-1 pt ME4 Brominal-4 lb/gal or 1 pt Buctril-2 lb/gal (3/4-1 + 1/4-1/2 act)

**FOXTAIL, WILD OATS,
SOME ANNUAL
BROADLEAVES**

Tank-mix. Hoelon provides good to very good control of foxtail and wild oats. Bromoxynil controls annual broadleaves. Weed and crop stage, rates, and application directions are the same as for products used alone. Do not add other herbicides or crop oil concentrate.

CARBYNE (BARBAN)

1-1 1/2 pt Carbyne-2 lb/gal (1/4-3/8 act)

WILD OATS

Apply when wild oat is in 2-leaf stage but before 12-leaf stage of crop. Good wild oat control if emergence is uniform. Excellent crop tolerance. Use lower rate under cool, wet conditions. Use 5 to 10 gpa carrier and 45 psi pressure with the boom on ground equipment rotated forward so spray hits weeds at 45° angle. Use 3 to 5 gpa carrier for aerial application. Do not tank-mix with other herbicides. Do not use on flax underseeded to alfalfa. Do not graze treated fields until after crop harvest.

TRITICALE

BUCTRIL (BROMOXYNIL)

1-1½ pt Buctril-2 lb/gal

**WILD BUCKWHEAT,
SUNFLOWER,
SOME ANNUAL
BROADLEAVES**

Contact herbicide. Excellent wild buckwheat control. Not effective on perennials. Very good crop tolerance on small grains. Rate of 1½ pt Buctril per acre suggested for most situations. Minimum carrier is 10 gpa for ground and 5 gpa for aerial application. Do not graze treated areas for 30 days after application.

TRITICALE. Apply at 2-leaf to early boot crop stage. Combination with MCPA or 2,4-D not labeled.

SMALL GRAIN (underseeded to alfalfa)

MCPA AMINE

½ pt MCPA amine-4 lb/gal (¼ act)

**LAMBSQUARTERS,
MUSTARD, RAGWEED,
PIGWEEED**

Apply when companion crop is in tillered to boot stage and legume seedlings are 2 to 3 inches tall. Not for vetch or clover. Emergency treatment for heavy weed growth. Crop and/or weed canopy reduces risk of crop injury. Check product label.

PROSO MILLET

2,4-D AMINE

½-1 pt 2,4-D amine-3.8 lb/gal (¼-½ act)

BROADLEAVES

Selective, translocated herbicide for several annual and perennial broadleaved weeds. Very good control of several annual broadleaves; less effective for kochia or wild buckwheat. Good crop tolerance at proper growth stage. Avoid treating at boot to heading. Rate of 1 pt has been satisfactory for most general broadleaved problems. Rate of ½ pt will control small susceptible weeds such as wild mustard. Use maximum rate (1½ pt) for perennials, if some crop injury can be tolerated. Apply by air or ground. Do not graze dairy or slaughter animals on treated areas for 2 weeks after application. NOTE: Labeling for millet limited to certain products. IR-4 Minor Crop Project.

MILLET. Apply from 5-leaf to early boot stage after crop tillering. Earlier treatment may reduce number of tillers.

AATREX (ATRAZINE)

1-4 pt AAtrex-4 lb/gal or .6-2½ lb AAtrex-80W or ½-2¼ lb AAtrex Nine-0-90wdg (½-2 act)

**SEVERAL
ANNUAL
BROADLEAVES,
SOME ANNUAL
GRASSES**

Excellent control of several annual broadleaves. Poor to fair control of annual grasses. Risk of injury greatest on light, low organic matter soil and under cold, wet conditions. Stands may be reduced. Use high rate on heavy, clay, high organic matter soil.

Minimum carrier is 10 gpa for ground or 2 gpa for air.

Millet, corn, or sorghum may be planted the following year. Susceptible crops such as soybeans, sunflowers, small grain, or grass/legumes should not be planted the following year. Do not graze or feed forage for 21 days after application.

SHALLOW PREPLANT INCORPORATED. Apply within 2 weeks of planting and incorporate into top 2 inches of soil with a field cultivator or shallow disk during final seedbed preparation. Most consistent application method. Reduced rainfall requirement for activation.

PREEMERGENCE. Requires ¾ to 1 inch of rain within one week of application. Less consistent than preplant.

SPECIAL WEED PROBLEMS

VOLUNTEER SUNFLOWERS

BRONATE OR 3+3 BROMINAL

All wheat and barley. Excellent, consistent control. Also very good on kochia and wild buckwheat. Very good crop tolerance. May be applied over wide range of crop growth stages. Good choice when kochia and wild buckwheat are also problems when crop is in the 4-leaf to early boot stage. Good coverage important. Refer to Bronate or 3+3 Brominal section for the specific crop.

BANVEL + MCPA AMINE

Durum, hard red spring wheat, and oats. Very good to excellent, consistent control. Short residual control if topsoil is moist. Also very good on kochia and wild buckwheat. Fair crop tolerance. Better crop tolerance with MCPA than with 2,4-D in the combination. Application limited to a narrow range of crop growth stages. Do not apply late. Good choice for early spraying of dense stands when kochia and wild buckwheat are also problems in crops at the 3- to 4-leaf stage. Refer to Banvel + MCPA section for specific crop.

MCPA AMINE OR ESTER

All wheat, barley, and oats. Good to very good control of small sunflowers. Also controls mustard and lambsquarters but less effective on many other weeds or large sunflowers. Excellent crop tolerance at a wide range of growth stages. The safest treatment for oats. Use 1 pt/A for most situations. Ester form preferred. Good choice when kochia or wild buckwheat is not a problem and treatment must be made before wheat or barley is tillered or at very late crop growth stages. Also good choice for retreating second flush. Refer to MCPA section for specific crop.

2,4-D AMINE OR ESTER

All wheat, barley, and oats. Amine only on oats. Good to very good control. Good crop tolerance when applied at the 5-leaf to early boot stage of wheat or barley or 3- to 4-leaf stage of oats. Use 1/3 lb/A acid equiv for ester and 1/2 lb/A acid equiv for amine. Ester better on larger sunflowers. Controls several other broadleaves. Good choice for light to moderate infestations in fields where other broadleaves are present and spraying is delayed until crop reaches the proper stage. Refer to 2,4-D section for specific crop.

WILD BUCKWHEAT

TORDON 22K + 2,4-D OR MCPA

Winter wheat, hard red spring wheat, barley, and oats. Refer to Tordon 22K + 2,4-D or MCPA section for specific crop.

BANVEL

All spring wheat and oats. Usually used as a tank-mix with MCPA or 2,4-D to improve control of other weeds. Use MCPA combination on oats. Refer to specific crop section.

BUCTRIL OR ME4 BROMINAL

All wheat, barley, and oats. Usually used in combination with MCPA (Bronate, 3+3 Brominal) on all wheat or barley. Refer to specific crop section.

FIELD BINDWEED

2,4-D AMINE OR ESTER

All wheat, barley, and oats. Amine only on oats. Use maximum rate unless willing to accept risk of crop injury with higher rates of 1/2 lb/A acid equiv for ester or 3/4 lb/A acid equiv for amine. Refer to 2,4-D section for specific crop.

CANADA THISTLE

2,4-D AMINE OR ESTER

Same as for field bindweed.

MCPA AMINE OR ESTER

Same as for 2,4-D on field bindweed. Better crop tolerance, especially in oats. Use maximum rates for product.

PENNYCRESS, BLUE MUSTARD

2,4-D ESTER OR AMINE

Winter wheat. Apply in spring when weeds are in rosette stage. Most other weeds will not have emerged. Use $\frac{1}{3}$ lb/A acid equiv 2,4-D ester or $\frac{1}{2}$ lb/A acid equiv for amine. Best results in warm weather. Some risk of crop injury. Refer to 2,4-D section for winter wheat.

BRONATE OR 3+3 BROMINAL

Winter wheat. Apply in spring when weeds are in rosette stage. Most other weeds will not have emerged. Best crop tolerance. Best results in warm weather. Refer to Bronate or 3+3 Brominal section for winter wheat.

GLEAN

Wheat, barley, and oats. Apply early postemergence. Excellent control. Refer to Glean section for wheat.

NO-TILL SMALL GRAIN

GLEAN (CHLORSULFURON)

$\frac{1}{3}$ - $\frac{1}{2}$ oz Glean-75%df (.016-.02 act)

SOME ANNUAL GRASSES AND BROADLEAVES

Refer to Glean in wheat and barley section for preemergence or postemergence applications made in planted or growing crop. Glean may also be applied for fallow to be planted to winter wheat, hard red spring wheat, and durum as listed below.

SPRING OR SUMMER IN CROP BEFORE FALLOW. Apply $\frac{1}{3}$ to $\frac{1}{2}$ oz/A in wheat or barley before boot stage. High rates will give some after harvest control into fallow period.

FALL AFTER HARVEST. Apply $\frac{1}{3}$ to $\frac{1}{2}$ oz/A early postemergence in fallow before weeds are over 2 inches tall.

SPRING. Apply $\frac{1}{3}$ to $\frac{1}{2}$ oz/A early postemergence in fallow before weeds are over 2 inches tall.

NOTE application guidelines, planting restrictions, weed species information for Glean in the wheat section of this publication.

ALLY (METSULFURON)

1/10 oz Ally-60df (0.004 act)

Ally applied postemergence controls several annual broadleaved weeds. Residual properties provide 1 to 6 weeks residual that may be useful for short-term control in fallow. Labeling includes general directions for Ally tank-mixes with other herbicides. Combinations with 2,4-D or Banvel give additional control of larger broadleaf weeds. Combination with Glean, atrazine, or Bladex add residual control. Refer to labels for each product. Rates and application directions for tank-mixes as specified for each product.

FALLOW: Apply during fallow in fall after harvest or in spring.

TREFLAN (TRIFLURALIN)

6 $\frac{1}{4}$ -10 lb Treflan-10% gran ($\frac{2}{3}$ -1 act)

FOXTAIL, SOME ANNUAL BROADLEAVES

Summer fallow to be planted to hard red spring, durum wheat, and barley the following spring. Used for foxtail control during the fallow period and some residual control of foxtail in the following crop. Reports indicate very good control. Also gives fair control of lambsquarters and pigweed. Cultivation or other herbicides required for escaped broadleaves. Granules may be applied into standing stubble or to soil that has been tilled. Reduces the total tillage required during fallow.

Fallow Application. Treflan rate varies according to application date. Rate of Treflan 10% gran for areas receiving greater than 10 inches annual rainfall is 10 lb from April 15 to April 30; 10-8 $\frac{3}{4}$ lb from May 1 to May 31; 8 $\frac{3}{4}$ -7 $\frac{1}{2}$ lb from June 1 to June 30; 7 $\frac{1}{2}$ -6 $\frac{1}{4}$ lb from July 1 to July 31; and 6 $\frac{1}{4}$ -5 lb from August 1 to August 31. Use high rate for beginning of each time period and the low rate late in the period. Areas receiving less than 10 inches annual rainfall should reduce the above rates by 1 $\frac{1}{4}$ lb. Incorporate within 24 hours using a tandem disk, field cultivator, or chisel equipped with large sweeps. The second incorporation and additional shallow tillage can be completed whenever escaping weeds make it necessary. Crop seed should be planted 2 inches deep.

NO-TILL SMALL GRAIN (continued)

GRAMOXONE (PARAQUAT)

1 1/2-5 pt Gramoxone-1.5 lb/gal (1/4-1 lb act)

NONSELECTIVE

Paraquat is a nonselective contact herbicide that may be applied before planting until just before crop emerges. No soil residual. Useful for controlling emerged weeds before planting in no-till or reduced tillage systems. May be used before planting barley or wheat. Minimum carrier is 20 gpa for ground or 5 gpa for air. Use 1 pt X-77 spreader per 100 gal of solution. Gramoxone Super will be the new paraquat product containing 1.5 lb/gal act. The amount of product will have to be adjusted accordingly to apply the same rate per acre. Follow handling precautions, as paraquat is highly toxic. RESTRICTED USE PESTICIDE.

ROUNDUP (GLYPHOSATE)

4-16 fl oz Roundup - 3 lb/gal (.1-3/8 act)

ROUNDUP + 2,4-D LANDMASTER (GLYPHOSATE + 2,4-D)

*4-16 fl oz Roundup - 3 lb/gal + 1 pt 2,4-D amine - 4 lb/gal (.1-3/8 + 1/2 act)
27-54 fl oz Landmaster (1/5-3/8 + 1/3-2/3 act)*

ROUNDUP + BANVEL (GLYPHOSATE + DICAMBA)

4-16 fl oz Roundup - 3 lb/gal + 1/2 pt Banvel - 4 lb/gal (.1-3/8 + 1/4 act)

LANDMASTER + BANVEL (GLYPHOSATE + 2,4-D + DICAMBA)

27-54 fl oz Landmaster + 1/4-1 pt Banvel - 4 lb/gal (1/5-3/8 + 1/3-2/3 + 1/8-1/2 act)

ROUNDUP + GLEAN (GLYPHOSATE + CHLORSULFURON)

LANDMASTER + GLEAN (GLYPHOSATE + 2,4-D + CHLORSULFURON)

*12-16 fl oz Roundup-3 lb/gal + 1/3-1/2 oz Glean 75df (1/4-3/8 + .015-.02 act)
27-54 fl oz Landmaster + 1/3-1/2 oz Glean 75df (1/5-3/8 + 1/3-2/3 + .015-.02 act)*

NONSELECTIVE

Roundup is a nonselective, translocated herbicide with no soil residual. It may be applied in stubble after harvest, in fallow, or prior to planting certain crops. Rates are intended primarily for annual grass and volunteer grain. The higher rates give topgrowth suppression of perennials. One to four quarts are required for consistent stand reduction of perennials. The low rate, low carrier volume applications are in 3 to 10 gpa for air. Aerial applications using 1 to 2 gpa have been satisfactory in some situations; however drift control and coverage of tall or dense weed growth is more difficult. Weeds should be growing actively and not cut at harvest. Straw should be removed or settled. Hard water reduces control, especially at high carrier rates. Addition of ammonium sulfate at 17 lb/100 gal frequently improves results. Add surfactant at 2 to 4 qt/100 gal of solution. Avoid tillage for 1 day after application. Avoid drift to sensitive crops.

ROUNDUP. The product label includes Roundup rates of 8 to 16 fl oz (1/2-1 pt) per acre when used alone. Use 8 fl oz for foxtail; 12 fl oz for barnyardgrass, downy brome in cultivated fields, and mustard, volunteer barley, rye and wheat; 16 fl oz for pennycress, shepherds purse, lambsquarters, wild oat, pigweed, witchgrass, and downy brome in no-till systems. Maximum weed size varies from 6 to 18 inches. These rates have provided the most consistent results.

Special state (24(c)) label includes lower Roundup rates of 4 to 16 fl oz (1/4-1 pt) per acre for special situations when used alone or in combination with 2,4-D or Banvel. The 4 to 6 fl oz rates are limited to use for foxtail and seedling volunteer wheat when conditions are ideal. Follow application directions and use surfactant and ammonium sulfate as described above. These low rates may be adequate when retreating to control emerging volunteer wheat just prior to planting winter wheat. Control with low rates is more variable.

ROUNDUP + 2,4-D (LANDMASTER). Roundup rates for the tank-mix on the product label are 12 to 16 fl oz (3/4-1 pt) per acre as suggested for Roundup alone. Add 1 pt 2,4-D amine per acre. Landmaster is a commercial premix containing 0.9 lb glyphosate (Roundup) + 1.5 lb 2,4-D isopropylamine acid equiv. per gal. Landmaster rates vary according to weed species. Rates are 27 to 54 fl oz (1 2/3 - 3 3/8 pt) per acre. Use 27 fl oz for green foxtail only; 40 fl oz for other foxtail species, witchgrass, downy brome in cultivated fields, purselane, lambsquarters, tansy mustard, pigweed, Russian thistle, and volunteer barley, rye, and wheat; 54 fl oz for barnyardgrass or kochia and downy brome in no-till systems. These rates give consistent results in most situations. The special state (24(c)) label includes Roundup rates as low as 4 to 6 fl oz with 1/4 to 1/2 lb 2,4-D per acre for foxtail and wheat seedlings when conditions are ideal. Follow application directions and use of additives as for Roundup alone.

ROUNDUP + BANVEL. Tank-mix. Banvel improves control of annual broadleaves such as kochia and wild buckwheat. Roundup rates on the product label are 12 to 16 fl oz ($\frac{3}{4}$ -1 pt) per acre as suggested for specific weeds for Roundup + 2,4-D. The special state (24(c)) label includes Roundup rates as low as 4 to 6 fl oz with $\frac{1}{8}$ to $\frac{1}{4}$ lb Banvel per acre for foxtail and wheat seedlings when conditions are ideal. Follow application directions and use additives as for Roundup alone. Add $\frac{1}{4}$ to $\frac{1}{2}$ pt Banvel for annuals and $\frac{1}{2}$ to 1 pt per acre to control broadleaved perennial topgrowth. The low Banvel rate is adequate for seedling broadleaves; somewhat higher rate is required for larger kochia. Allow 45 days per pint before planting wheat, barley, or oats if over $\frac{1}{4}$ pt/A is used; however, a 7 to 10 day interval is recommended to reduce concern for residual effects under certain conditions.

ROUNDUP or LANDMASTER + GLEAN. Tank-mix. Provides residual control of foxtail and several annual broadleaves in fallow or after crop harvest. Controls emerged weeds in systems using Glean. Most useful in fallow prior to planting wheat. Refer to section for Roundup or Landmaster or Glean alone for application directions and crop rotation guidelines.

HERBICIDE COST

The table below gives the cost per acre for several herbicide treatments, based on retail price. Cost for low and high rates are listed. Prices may be slightly lower; depending on location, quantity, and seasonal variations. Consult your local dealer for actual prices.

HERBICIDE	AMT OF PRODUCT/A	HERBICIDE COST/A
MCPA amine	$\frac{1}{2}$ -1 pt	\$.75- 1.40
MCPA ester	$\frac{1}{2}$ -1 pt	1.05- 2.10
2,4-D amine (3.8 lb)	$\frac{1}{2}$ -1 pt	.50- 1.00
2,4-D ester (3.8 lb)	$\frac{1}{2}$ -1 pt	.65- 1.40
Banvel + MCPA	$\frac{1}{8}$ - $\frac{1}{4}$ pt + $\frac{1}{2}$ - $\frac{3}{4}$ pt	1.65- 2.85
Banvel + 2,4-D	$\frac{1}{8}$ - $\frac{1}{4}$ pt + $\frac{1}{2}$ - $\frac{3}{4}$ pt	1.35- 2.45
Buctril	$\frac{1}{2}$ -2 pt	8.30-10.90
ME4 Brominal	$\frac{1}{2}$ -1 pt	5.40-10.75
Bronate	1-2 pt	6.05-12.05
3+3 Brominal	$\frac{2}{3}$ -1 $\frac{1}{3}$ pt	6.10-12.25
Tordon + MCPA	1-1 $\frac{1}{2}$ oz + $\frac{1}{2}$ - $\frac{3}{4}$ pt	1.45- 2.70
Tordon + 2,4-D	1-1 $\frac{1}{2}$ oz + $\frac{1}{2}$ - $\frac{3}{4}$ pt	1.25- 1.85
Stampede + MCPA	3 pt + $\frac{1}{2}$ pt	7.80
Treflan (4 lb)	1-1 $\frac{1}{2}$ pt	3.35- 5.05
Treflan 10G	5-7 $\frac{1}{2}$ lb	3.95- 5.90
Glean	1/6- $\frac{1}{2}$ oz	2.75- 8.20
Ally	1/10 oz	2.65
Modown	$\frac{1}{2}$ -2 pt	4.35- 5.80
Far-go (4 lb)	1-1 $\frac{1}{4}$ qt	9.35-11.70
Far-go 10G	12 $\frac{1}{2}$ -15 lb	10.75-12.90
Hoelon	2-3 $\frac{1}{3}$ pt	12.35-20.50
Carbyne	1-1 $\frac{1}{2}$ pt	4.15- 6.25
Avenge	2 $\frac{1}{2}$ -4 pt	12.95-20.85
Dowpon	1 lb	2.25
Ramrod	4 qt	16.60
Gramoxone	1 $\frac{1}{2}$ -5 pt	6.55-26.20
Roundup	$\frac{1}{4}$ -1 pt	2.60-10.35