

1973

EC73-130 A 1973 Guide for Herbicide Use in Nebraska

John D. Furrer

Charles Fenster

Alex R. Martin

Follow this and additional works at: <http://digitalcommons.unl.edu/extensionhist>

Furrer, John D.; Fenster, Charles; and Martin, Alex R., "EC73-130 A 1973 Guide for Herbicide Use in Nebraska" (1973). *Historical Materials from University of Nebraska-Lincoln Extension*. 4187.
<http://digitalcommons.unl.edu/extensionhist/4187>

This Article is brought to you for free and open access by the Extension at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Historical Materials from University of Nebraska-Lincoln Extension by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

AGRI
S
85
E7
73-130
EC-73-130

Ag North
Metal filed
E.C. 73-130

RECEIVED

FEB 16 1973

C. Y. THOMPSON
LIBRARY

A 1973 GUIDE FOR --- HERBICIDE USE IN NEBRASKA...

JOHN D. FURRER

Agricultural Extension Agronomist
(Pesticide Safety and Weed Science)

ALEX R. MARTIN

Agricultural Extension Agronomist
(Weed Science)

RUSSELL MOOMAW

Area Extension Specialist (Crops)

CHARLES FENSTER

Agricultural Extension Agronomist
(Crop Management)

GAIL WICKS

Agricultural Extension Agronomist
(Weed Science)

This circular deals principally with herbicides as an aid for crop production. Good farming practices including crop rotations, clean seed, adapted varieties, proper seedbed preparation, proper planting date and depth, adequate row and plant spacings, timely cultivation, and adequate fertilization are, as always, of prime importance if weed problems are to be kept to a minimum. Also, of paramount importance is the prevention of weed seed production and dissemination.

The suggestions for herbicide use contained in this circular are based on research results at the Nebraska Agricultural Experiment Station and elsewhere.

The information given herein is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Cooperative Extension Service is implied.

To avoid dangers of drift, exercise judgment when spraying. Do not make field applications when wind velocity exceeds 8 mph. Wind will cause poor coverage and excessive drift. **DO NOT USE 2,4-D ESTER, DICAMBA (BANVEL), AND SIMILAR HERBICIDES NEAR VEGETABLES, ORNAMENTALS, TREES, SHRUBS, AND BROADLEAF CROPS.**

Genetic strains, varieties, and hybrids vary in their response to herbicides. Check with your seed dealer for information on the crop you plan to treat.

Be sure to calibrate application equipment.

Extension Service

University of Nebraska College of Agriculture

Cooperating with the U.S. Department of Agriculture
and the College of Home Economics

E. F. Frolik, Dean; J. L. Adams, Director



"Use Crop Production
Chemicals Wisely!"

● READ THE LABEL BEFORE EACH USE. Follow instructions; heed all cautions and warnings.

● APPLY ONLY AS DIRECTED, to the crops specified, in amounts specified and at times specified. *Federal law authorizes seizure of any raw agricultural commodity moving in interstate commerce which carries a pesticide residue in excess of the established tolerance.*

● STORE IN ORIGINAL, LABELED CONTAINERS. Keep out of reach of children, pets, livestock and irresponsible people.

● ELIMINATE EMPTY CONTAINER HAZARDS. Rinse empties that contained liquids. Two rinsings remove most of the chemical. **BURN PAPER BAGS AND FIBER DRUMS.** Stay out of the smoke.

FIELD CROPS—PREPLANT AND PREEMERGENCE

Band applications reduce total herbicide used.

Preplant treatments are made before planting the crop. Preemergence treatments are applied from planting time to just before plant emergence. Postemergence treatments are applied after emergence of weeds or crop. Weed control with preemergence treatments may be poor if there is no rain to leach the herbicide into the surface soil. To overcome dependence on rainfall and to increase dependability some preemergence herbicides may be incorporated into the surface soil with a suitable implement. Excessive rainfall may leach some of the more soluble herbicides too deeply, especially on sandy soils. Soils high in organic matter or clay content generally require more herbicide than do sandy soils for equivalent weed control. Weed control with pre-

emergence herbicides is more satisfactory on surface-planted crops and when applied to prepared seedbeds free of clods, trash, and weeds.

Some weed species are resistant to particular herbicides. Herbicides should be rotated to control a wider spectrum of weeds and to reduce the build-up of any particular herbicide in the soil. *If you use atrazine plant only corn or sorghum the following year—it may carry over and injure alfalfa, beans, potatoes, sugar beets, and small grains.* Herbicide residue problems in soils increase as one goes westward in Nebraska.

Sprayers should provide good agitation of spray solution and be equipped with 50-mesh or coarser screens to avoid clogging with wettable powders.

Crop	Herbicide	Lb active material needed/A	Apply this amount commercial product/A	Application time	Remarks (See chart for weed response)
Corn (See page 7 for shattercane control)	alachlor	2.5	2.5 qt Lasso EC or 25 lb granules	Preemergence	Deteriorates some synthetic parts. Consult company brochure for resistant materials.
	alachlor + atrazine	1.5 + 1	1.5 qt Lasso EC + 1.25 lb AAtrex 80W	Preemergence	Tank mix.
	atrazine	2 to 3	AAtrex—2.5 to 3 lbs 80W or 2 to 3 qts 4L	Preplant or preemergence	Do not exceed 1.6 lb/A atrazine on sandy soil low in organic matter.
	butylate + atrazine	3 + 1	8.3 lb Sutan-Atrazine 36-12 WP or 2 qt Sutan + 1.25 lbs AAtrex 80W	Preplant	Incorporate immediately by cross tandem disking or equivalent soil mixing. Sutan + AAtrex tank mix.
	propachlor + atrazine	2.4 + 1	5 lb Ramrod-Atrazine 69 WP	Preemergence	May cause irritation to applicator.
Field beans	EPTC	3	2 qt Eptam	Preplant	Immediately incorporate by cross tandem disking or equivalent soil mixing.
	EPTC + trifluralin	1.5 + 0.5	1 qt Eptam + 0.5 qt Treflan	Preplant	
Sorghum (For south central and eastern Nebraska only) (entire state)	atrazine	2 to 2.4	AAtrex—2.5 to 3 lb 80W or 2 to 2.4 qt 4L	Preplant or preemergence	Do not use on sandy soils or soils low in organic matter. Heavy rains may leach atrazine and cause injury to sorghum. Preplant applications should be made only on fine textured soils. Do not feed propachlor treated forage to dairy animals.
	atrazine + norea	0.8 + 1.6	3 lb Herban 21A	Preemergence	
	propachlor + atrazine	2.4 + 1	5 lb Ramrod-Atrazine 69 WP		
	propachlor	4	6 lb Ramrod 65W	Preemergence	
Soybeans	alachlor	2.5	2.5 qt Lasso EC or 25 lb granules	Preemergence	Deteriorates some synthetic parts.
	alachlor + chlorbromuron	1.5 + 1.5	1.5 qt Lasso EC + 3 lb Bromex or Maloran	Preemergence	Tank mix. Alachlor deteriorates some synthetic parts.
	alachlor + linuron	2 + 1	2 qt Lasso EC + 2 lb Lorox 50W		
	fluorodifen	3.75	5 qt Preforan or Soyex	Preemergence	Do not incorporate.
	chloramben	2 to 3	4 to 6 qt Amiben	Preemergence	Shallow incorporation may be beneficial.
	trifluralin	0.75	0.75 qt Treflan	Preplant	Immediately incorporate by cross tandem disking or equivalent soil mixing. Vernolate may cause early soybean injury.
	vernolate	2.5	1.7 qt Vernam		
Sugar beets	cycloate	3 to 4	2 to 2.6 qt Ro-Neet	Preplant	Immediately mix into dry soil with power incorporator 1 to 2 inches. Do not use on sandy soils below 1% in organic matter. See Campaign Circular 204.

WEED RESPONSE TO SELECTED PREPLANT AND PREEMERGENCE HERBICIDES ^a

Herbicide	annual morningglory	barnyard grass	black nightshade	cocklebur	crabgrass	fall panicum	foxtail	jimsonweed	kochia	lambquarters	pigweed	ragweed	sandbur	shattercane	smartweed	sunflower	velvetleaf	Crop tolerance ^b
	Corn																	
AAtrex	E	G	E	G	F	P	G	E	E	E	E	E	F	P	E	E	E	E
Eptam	F	E	E	P	E	E	E	P	G	G	G	F	E	E	P	P	P	F ^c
Lasso	P	E	G	P	E	E	E	P	P	G	E	F	F	P	P	P	P	E
Lasso-Atrazine	G	E	E	F	G	G	E	F	E	E	E	E	F	P	G	G	G	E
Ramrod-Atrazine	G	G	G	F	G	G	E	F	E	E	E	E	F	P	G	G	G	E
Sutan	F	E	G	P	E	E	E	P	P	G	G	F	E	G	P	P	P	G
Sutan-Atrazine	G	E	E	F	E	G	E	G	E	E	E	G	G	G	G	F	G	G
Sorghum																		
AAtrex	E	G	E	G	F	P	G	G	E	E	E	E	F	P	E	E	E	F
Herban 21A	G	G	G	F	G	F	G	F	E	E	E	G	F	P	G	G	G	G
Ramrod	P	G	P	P	G	G	E	P	P	F	G	P	F	P	P	P	P	G
Ramrod-Atrazine	G	G	G	F	G	F	E	F	E	E	E	G	F	P	G	G	G	G
Soybeans																		
Amiben	P	G	G	P	G	G	G	P	G	G	G	G	F	P	G	P	G	G
Lasso	P	E	G	P	E	E	E	P	P	G	E	P	F	P	P	P	P	G
Lasso-Bromex or Maloran	P	E	G	F	E	E	E	F	F	G	E	G	F	P	G	F	G	G
Lasso-Lorox	P	E	G	F	E	E	E	F	F	G	E	G	F	P	G	F	G	G
Preforan or Soyex	P	G	F	P	G	E	E	G	F	F	E	F	F	P	F	P	P	E
Treflan	P	E	P	P	E	E	E	P	F	G	G	P	E	E	P	P	P	G
Vernam	P	E	G	P	E	E	E	P	P	G	G	P	E	G	P	P	F	F
Sugarbeets																		
Ro-Neet	P	E	G	P	E	E	E	P	P	G	E	F	E	G	P	P	P	G
Fieldbeans																		
Eptam	F	E	E	P	E	E	E	P	G	G	E	F	E	E	P	P	P	G
Eptam-Treflan	F	E	F	P	E	E	E	P	E	E	E	P	E	E	P	P	P	E

WEED RESPONSE TO POSTEMERGENCE HERBICIDES

Corn																		
AAtrex + crop oil	E	F	E	E	F	P	F	E	E	E	E	E	F	P	E	E	E	G
2,4-D	E	P	F	E	P	P	P	G	G	G	G	G	P	P	P	G	F	F
2,4-D + Banvel	E	P	P	E	P	P	P	F	G	G	G	G	P	P	E	G	G	G
Sorghum																		
AAtrex	E	F	E	E	F	P	F	E	E	E	E	E	F	P	E	E	E	F
2,4-D	E	P	F	E	P	P	P	G	G	G	G	G	P	P	P	G	F	F

Response ratings:
 E = Excellent
 G = Good
 F = Fair
 P = Poor

Plant response may be altered by growing conditions, soil type, and rates of application. Ratings may vary from season to season and geographical areas within the state.

^a See Pages 5-7 for additional problem weeds and their control
^b Crop varieties vary in response to herbicides
^c Protectants improve crop tolerance

FIELD CROPS POSTEMERGENCE

Excellent growing conditions make weeds more susceptible to postemergence herbicides. Likewise, crops may be more subject to herbicide damage when growing rapidly. *Adjust herbicide dosages downward* when excellent conditions for growth are present the week before application and *upward* when ideal growth is limited by one or more factors.

Crop	Herbicide	Lb active material needed/A	Apply this amount commercial product/A	Application time	Remarks
Barley and spring wheat	2,4-D amine	0.50 to 0.75	1 to 1.50 pt ³	5-leaf to early boot	Do not treat winter barley in the fall. Spray broadleaf weeds as soon as good growing conditions occur in the spring. See page 7 for wild buckwheat control.
	2,4-D ester	0.25 to 0.50	0.50 to 1 pt ³		
Corn	atrazine	2	AAtrex 2.5 lb 80W or 2 qt 4L	grass weeds 1" or less	Use with water or water-oil mixtures. Read product label.
	2,4-D amine	0.50 to 1	1 to 2 pt ³	Before corn is 8" high—over 8" use drop nozzles	Later applications may cause brittleness and stalk breakage. Use lower rate when good growing conditions exist to reduce corn injury.
	2,4-D ester	0.25 to 0.50	0.50 to 1 pt ³		
	2,4-D amine + dicamba	0.25 + 2 oz.	0.50 pt 2,4-D ³ + 4 oz Banvel		
Oats	2,4-D amine	0.50	1 pt ³	6-leaf to flag leaf	Some injury from 2,4-D may be expected at any stage. Refer to page 7 for wild buckwheat control.
	MCPA	1	1 qt ³		
Sorghum	atrazine	2	AAtrex 2.5 lb 80W or 2 qt 4L	grass weeds 1" or less	Use with water. Read product label.
	2,4-D amine	0.50	1 pt ³	During the period sorghum is 4" to 12" high. Over 12" use drop nozzles	Spraying before 4" stage may inhibit root development. Spraying without drop nozzles after 12" through early boot may inhibit head development.
	2,4-D ester	0.25	0.50 pt ³		
Sugar beets	dalapon	2 to 4	2.7 to 5.4 lb Dowpon	Grass weeds less than 2" tall	For annual grasses. Use higher rate (4 lb/A) on grass taller than 2". For broadleaf weed control see Campaign Circular 204, Weed Control in Sugarbeets.
Winter wheat	2,4-D amine	0.50 to 0.75	1 to 1.5 pt ³	Before early boot	Do not spray winter wheat in the fall. Spray broadleaf weeds as soon as good growing conditions occur in the spring. Refer to page 7 for wild buckwheat control.
	2,4-D ester	0.25 to 0.50	0.5 to 1 pt ³		

NON-CROP AREAS

Area or use	Herbicide	Apply this amount of commercial product	Application time	Remarks
Chemical mowing	cacodylic acid	1-2 gal Phytar 560/A	Postemergence	Apply on a warm sunny day.
	paraquat	2 qt Paraquat/A	Postemergence	Use enough water to insure good coverage. Add 1/2% x-77 wetting agent to spray solution.
Roadsides (Broadleaf weed control)	2,4-D	1 qt ³ 2,4-D/A	Broadleaf weeds 2 to 6 inches	Repeat treatments may be necessary. For woody species replace 1/2 lb 2,4-D with 1/2 lb 2,4,5-T.
	2,4-D + dicamba	1 qt ³ 2,4-D + 1 pt Banvel/A		
Irrigation ditchbanks	diuron or monuron	5-10 lb Karmex or Telvar/A	Soon after ditches are open. Treat before weeds appear or soon thereafter.	Use enough water to insure good coverage. Use 50 mesh or coarser screens. May injure nearby trees and shrubs.
	atrazine or simazine	7.5 lb AAtrex 80W or Princep 80W/A or 1.5 gal AAtrex 4L/A		
Long term vegetation control	prometone	1 pt Pramitol 25E or 10-20 lb Pramitol 5PS/1000 sq ft	Treat before weeds appear or soon thereafter.	Some weeds will require higher rates. Consult label for specific instructions on problem weeds and conditions. Herbicides listed for irrigation ditchbanks can also be used for long term vegetation control. Consult label for rates.
	bromacil	0.5 lb Hyvar X or 1.5 pt Hyvar XL/1000 sq ft		
	bromacil + diuron	0.5 lb Krovar I/1000 sq ft		
	karbutilate	5 lb Tandex 4G or 0.25 lb Tandex 80W/1000 sq ft		

PASTURES, RANGES, AND FORAGE CROPS

Area or use	Herbicide	Lb ¹ active material needed/A	Apply this amount commercial product/A	Application time	Remarks
	benefin	1.1 to 1.5	3 to 4 qt Balan	Preplant	Immediately incorporate by cross tandem disking or equivalent soil mixing. Early legume injury may occur.
Alfalfa and birdsfoot trefoil seedlings	2,4-DB	1	2 qt 2 lb/gal amine Butyrac or Butoxone	When weeds are small	For broadleaf weeds. Do not use treated forage for 30 days. DO NOT CONFUSE WITH 2,4-D. Use when temperature is above 50°F.
	EPTC	3	2 qt Eptam	Preplant	Immediately incorporate by cross tandem disking or equivalent soil mixing. Early legume injury may occur.
Alfalfa (established 1 yr or more)	simazine	1 to 1.5	1.25 to 1.9 Princep 80W	Apply in late fall on dormant alfalfa	Primarily for winter annual weeds. Injury may occur on soils with less than 1% organic matter.
Cool-season grass seedlings	2,4-D	0.50 to 0.75	1 to 1.50 pt ³	2- to 4-leaf stage of grass	For broadleaf weeds.
Warm-season grass seedlings	2,4-D	0.25 to 0.50	0.50 to 1 pt ³		
Warm-season grasses for seed	atrazine, diuron, or monuron	3	3 qt AAtrex 4L or 3.75 lb AAtrex 80W, Karmex, or Telvar	Spring or fall before weed emergence	Do not use until second year after seeding. Less effective in heavy plant residues.
Annual or biennial broadleaf weeds in pastures and ranges including snow-on-the-mountain	2,4-D	1	1 qt ³	Rosette stage in fall or when weeds are small in spring	Withhold milk cows from grazing treated areas for 7 days after application. With dicamba mixture do not harvest hay for dairy animals within 37 days of application.
	2,4-D + dicamba	1 + 0.5	1 qt 2,4-D ³ + 1 pt Banvel		
Perennial broadleaf weeds in pastures and ranges. Includes vervains, broom snake-weed, western ironwood and woolly loco	2,4-D	1 to 2	1 to 2 qt ³	At bud stage of predominant weeds. ² April for dandelions	Annual treatment for 2 to 3 years may be necessary. Withhold milk cows from grazing treated areas for 7 days after application. With dicamba mixture do not harvest hay for dairy animals within 37 days of application.
	2,4-D amine + dicamba	1 + 0.5	1 qt 2,4-D ³ + 1 pt Banvel		

TROUBLESOME WEEDS AND WOODY PLANTS

Best control will be obtained if treatments are made when plants are actively growing. Plan to make more than one treatment. An application just before flowering and a second application on fall regrowth will give best results on most perennials.

Weed	Herbicide	Lb ¹ active material needed/A	Apply this amount commercial product/A	Application time	Remarks
Bursage, Skeletonleaf and woollyleaf	2,4-D	2	2 qt ³ emulsifiable formulations	Early June or when growing actively ²	Same as for field bindweed except 2,4-D amine formulations less effective. If soil moisture conditions are poor, use oil-water emulsions as a carrier.
	2,4-D + dicamba	1 + 0.5	1 qt 2,4-D ³ + 1 pt Banvel		
Canada thistle	2,4-D	2	2 qt ³	Fall (rosette) and spring (early bud) ³	Same as for field bindweed.
	2,4-D + dicamba	1 + 0.5	1 qt 2,4-D ³ + 1 pt Banvel		
Cattails	2,4-D ester	6	1.5 gal ³ + 5% diesel oil + 0.5% emulsifier	Boot to early flowering.	Use the equivalent of 150 gal of water per acre. Retreat regrowth as necessary.
	dalapon	20	27 lb Dowpon + 5% diesel oil + 0.5% emulsifier	After flowering to fruiting	

¹ Refers to acid equivalent, phenol equivalent, or active ingredient as applicable, calculated on a broadcast or total coverage basis.

² Retreatment will be necessary.

³ Calculated on the basis of 4 lb/gal of acid equivalent (the chemicals in a product that are responsible for the herbicidal effects). For other formulations see conversion table on page 7.

Weed	Herbicide	Lb ¹ active material needed/A	Apply this amount commercial product	Application time	Remarks
Cottonwood, willows, and Siberian elm	2,4-D ester	2 to 3	2 to 3 qt ³	Full foliage (early June) or basal treatment anytime	Aerial equipment: at least 5 gal carrier/A. Annual treatment for 2 to 3 years may be necessary. Basal treatment: 2 qt of herbicide/10 gal of diesel. Spray tree trunk to point of runoff.
Downy brome	atrazine	2	2.5 lb AAtrex 80W or 2 qt AAtrex 4L	Preemergence (fall or spring prior to April 1)	Use in waste areas such as fence rows and ditchbanks. Use sufficient water to insure good coverage.
	simazine	2	2.5 lb Princep 80W		
Field bindweed	2,4-D	1	1 qt ³	Vigorous fall growth or bud stage in spring ²	Avoid tillage 10 weeks before and 1 week after application. Plan to treat for several consecutive years.
	2,4-D + dicamba	1 + 0.5	1 qt 2,4D ³ + 1 pt Banvel		
Hemp	2,4-D	0.5 to 1	1 pt to 1 qt	2 to 12 inches tall	At later growth stages use higher rate.
Hemp dogbane	2,4-D	1	1 qt ³	Bud stage ²	Use lower rates in crops.
	2,4-D	1 to 1.5	1 to 1.5 qt ³	Sept 1 to 30 ²	Surfactant may help. Can be used in standing corn and milo.
	2,4-D + dicamba	1 + 0.25	1 qt 2,4-D ³ + 0.5 pt Banvel	Bud stage ²	Use on fallow land only.
Hoary cress	2,4-D	2 to 4	0.5 to 1 gal ³ emulsifiable formulations	Rosette stage in the fall or early bud in spring ²	Same as for field bindweed except amine formulations less effective.
Johnsongrass (See shattercane for seedling control)	dalapon	5	6.7 lb Dowpon	8 to 12" new growth or regrowth ²	Repeat treatment 3 times, 10 to 20 days apart. Treat when 70°F or above.
	TCA	80	100 lb Sodium TCA	Early spring ²	Use enough water to insure good coverage. Retreat escaped plants.
	MSMA	3.5	3 qt Ansar 529 or 3 qt Daconate	Boot stage	Treat when 70°F or above. Do not use on cropland or grassland.
Leafy spurge	2,4-D	2	2 qt ³ emulsifiable formulations	Early bud stage in spring or late fall ²	Same as for field bindweed except amine formulations less effective. Control seedlings.
	2,4-D + dicamba	1 + 0.5	1 qt 2,4-D ³ + 1 pt Banvel	Fall or spring ²	See remarks for field bindweed.
Milkweed, common	amitrole	4	8 lb Amino Triazole or Weedazol	Bud to bloom stage ²	Use enough water to insure good coverage. Do not use amitrole on cropland.
	2,4-D + dicamba	1 + 0.25	1 qt 2,4-D ³ + 0.5 pt Banvel		
Mullein common	2,4,5-T or silvex	1 to 1.5	1 to 1.5 qt 2,4,5-T or Silvex	Late fall treatment of rosettes or spring before flowering stalks lengthen	Essential to apply in rosette stage.
Musk thistle	2,4-D	1.5 to 2	1.5 to 2 qt ³	Late fall treatment of rosettes or spring before flowering stalks lengthen	Chemicals other than 2,4-D not necessary for effective control. Annual treatments may be necessary for control of new seedlings.
Pricklypear	silvex	1 to 2	1 to 2 qt ³ Silvex	May 15 to June 15	Rotary hoe pads just prior to spraying. Add 1 gal/A diesel + 0.5% emulsifier in water carrier.
Poison ivy	amitrole	4	2 tbs Amino Triazole or Weedazol/gal water	Full foliage (June) ²	Thoroughly wet all vegetation. Do not apply amitrole to cropland nor use 2,4,5-T in recreational areas.
	2,4,5-T	2	2 tbs ³ per gal of water		
	2,4-D + 2,4,5-T	1 + 1			
Puncture vine	2,4-D ester	1	1 qt ³	Pre-bud stage most effective	Mature burs not affected by 2,4-D.
Ragweed, western (perennial)	2,4-D	1	1 qt ³	Early summer ²	Follow-up treatments may be necessary.

Weed	Herbicide	Lb ¹ active material needed/A	Apply this amount commercial product/A	Application time	Remarks
Russian knapweed	2,4-D	2	2 qt Emulsifiable formulations	Early bud stage ²	Same as for field bindweed except amine formulations less effective.
	2,4-D + dicamba	1 + 0.5	1 qt 2,4-D ³ + 1 pt Banvel		
Russian olive	2,4-D + 2,4,5-T	1 + 1	2 qt ³	Full foliage ² (early June)	See remarks for cottonwood.
Sagebrush (sand and fringed and green sagewort)	2,4-D ester	2	2 qt ³	4 to 8 inches new growth (June) ²	Use sufficient water to insure good coverage.
Shattercane (wild cane) and seedling Johnsongrass	butylate	4	2.7 qt Sutan	Preplant to corn	Incorporate immediately by cross tandem disking or equivalent soil mixing. Some crop injury may result from Eptam or Treflan. Plant corn on the land the year following Princep treatment. With protectants EPTC rate can be increased to 4 lb and waiting period eliminated.
	EPTC	3	2 qt Eptam	7 days prior to corn planting	
	simazine + EPTC	2 + 1.5	2.5 lb Princep 80W + 1 qt Eptam	Preplant to corn	
	trifluralin	1	1 qt Treflan	Preplant on soybeans	
Snowberry	2,4-D ester	1 to 2	1 to 2 qt ³	Full foliage ² (May 10 to 25)	Use sufficient water to insure good coverage.
Soapweed (Yucca)	silvex	2	2 qt ³	June ²	Use diesel as a carrier.
Swamp smartweed	2,4-D ester	1	1 qt ³	When growing vigorously ²	Controls top growth principally. Repeat treatment necessary.
Wild buckwheat	bromoxynil + MCPA	0.25 + 0.50	1 pt Brominil or Bucril + 1 pt MCPA ³	Early spring on winter wheat or oats	Thoroughly wet all vegetation. Do not use bromoxynil on oats.
	dicamba + 2,4-D amine	2 oz + 0.50 lb	4 oz Banvel + 1 pt 2,4-D ³		
	MCPA + dicamba	0.50 lb + 2 oz	1 pt MCP ³ + 4 oz Banvel		

CLEANING THE SPRAYER

First rinse the sprayer with a material which acts as a solvent for the herbicide. Kerosene and fuel oils carry away oil-soluble herbicides such as 2,4-D ester. Chemicals which form emulsions when mixed with water are oil-soluble. After the oil rinse, a rinse with water containing detergent will help remove the oil. Oil-soluble herbicides are the most difficult to remove. 2,4-D amine salts are water-soluble.

For most water-soluble herbicides repeated rinsing with water is usually enough. Hormone type require extra precautions. If 2,4,5-T, silvex, Banvel, or 2,4-D were used, fill the tank with water and ammonia. Add household ammonia at the rate of 1 quart of household ammonia to 25 gallons of water. Pump enough solution through the hose and nozzles to fill these parts completely. Then fill the tank, close, and leave for 24 hours before rinsing thoroughly with water.

Activated charcoal can be used after the preliminary rinsing to decontaminate the sprayer. A 3% suspension absorbs the 2,4-D. Agitate the suspension for 2 to 3 minutes and drain, then rinse thoroughly with clear water.

For wettable powder herbicides, see that none of the powder remains in the tank. A thorough rinsing with water is usually sufficient. Thoroughly clean all equipment immediately after use.

Conversion Table

Pounds of active material per gal of commercial product	Pints of commercial product needed per acre to give the following pounds of herbicide per acre		
	¼ lb	½ lb	1 lb
2.00	1	2	4
2.64	¾	1½	3
3.00	⅔	1¼	2¾
3.34	⅔	1½	2¾
4.00	½	1	2
6.00	⅓	¾	1½

¹ Refers to acid equivalent, phenol equivalent, or active ingredient as applicable, calculated on a broadcast or total coverage basis.

² Retreatment will be necessary.

³ Calculated on the basis of 4 lb/gal of acid equivalent (the chemicals in a product that are responsible for the herbicidal effects). For other formulations see conversion table above.

CALIBRATION OF EQUIPMENT

Calibrate equipment before using to make sure that it will apply the desired amount of herbicide solution per acre. Thoroughly clean and check equipment to see that all parts are working. Select the speed at which the equipment is to be operated and drive around in the field to be sure that everything is working properly. Calibrate on ground that has the same compaction as ground on which the equipment will be used. Final sprayer calibration should be made with spray solution.

Sprayers

The number of gallons per acre a sprayer will discharge depends upon the ground speed, nozzle pressure, spacing of nozzles, and size of nozzle opening (orifice). Herbicide formulations, spray carrier, and temperatures also affect spray discharge. The use of 110° nozzle tips will allow spraying closer to the ground and thereby reduce spray drift. Wettable powders will settle out if allowed to remain in spray tank without continuous agitation.

Calibrating Broadcast Type Sprayers

1. Measure the effective width of the boom in feet. (Number of nozzles times the spacing between any two adjacent nozzles.)
2. Set fan type nozzle height so there is a 50 percent overlap of the spray pattern or follow the manufacturer's recommendation.
3. Divide the width of the boom into 43,560 (the number of square feet in an acre) to get the number of feet of travel necessary to cover one acre.
4. Measure and stake off the number of feet you need to travel to cover one acre. (A fraction of an acre such as $\frac{1}{4}$ or $\frac{1}{2}$ can be used.)
5. Fill the supply tank and boom with clean water at the starting point to get an approximate calibration. Final calibration should be made with spray solution.
6. Spray the measured area exactly as you would in the field, using the same speed and pressure.
7. When you get to the end of the course immediately shut off the sprayer.
8. Measure carefully the number of gallons required to refill the spray tank. This is the volume of water the sprayer will deliver per acre—or fraction of acre as you determined in step 4. Final calibration should be made with spray solution.
9. Use this calibration information to determine the amount of herbicide to add to a given volume of water in the spray tank. Assume that you determined your sprayer applies 18 gallons per acre. If you want to spray three pounds of EPTC (Eptam, 6 lb/gal) per acre, add one-half gallon of Eptam to each 17½ gallons of water in the spray tank.

Calibrating Band Sprayers

Most principles involved in broadcast sprayer calibration also apply to band applicators. For band spray applications use "E" type orifice tips. They deliver the same amount of spray material over the entire width of the spray pattern.

With 40" row spacing on a planter, 13,080 feet of row are required for one acre. Traveling a distance of 327 feet with a 4-row planter is one-tenth of an acre ($327 \times 4 = 1308$).

Begin band sprayer calibration by attaching plastic bags or other containers to each nozzle to catch its output. Assume your equipment is 4-row, you travel 327 feet and collect a total of one gallon of water from the four nozzles. The one gallon represents an application of one-tenth of an acre; therefore your sprayer is applying 10 gallons per acre. Now determine the fraction of the total land area you will spray with your band treatment. A 10" band on 40" spaced rows covers $\frac{1}{4}$ of the total land area; a 10" band on 30" rows covers $\frac{1}{3}$ of the total land area; a 13" band on 40" rows covers approximately $\frac{1}{3}$ of the total land area.

The amount of land area you are covering with your band spray determines the amount of chemical to use. Assume you are using amiben (2 pounds per gallon) at 3 pounds per acre on soybeans planted in 30" rows. Your band width is 10". You will be treating $\frac{1}{3}$ of the total land area. Your rate of application will be $\frac{1}{3}$ of three or 1 pound per acre. Since amiben is formulated 2 pounds of active ingredient per gallon, you will use $\frac{1}{2}$ gallon of chemical to obtain the 1 pound of amiben. Therefore, your mixture ratio should be 9½ gallons of water to $\frac{1}{2}$ gallon of amiben.

Granular Applicators

The calibration of band applicators for granular herbicides is similar to band spray calibration. There is one main difference—there is no adjustment of band width as this is set by the manufacturer.

Set the rate control adjustment as suggested by the manufacturer. Add granules to the hopper. Attach bags or other containers so they collect all granules discharged by the applicator. If your unit is 4-row with 40" spacing travel 327 feet (this represents one-tenth acre). Remove the collecting containers (they should all contain approximately the same amount) and carefully weigh together all the granules collected.

Assume you collected 4 ounces of granules. Your applicator is applying 4 x 10 or 40 ounces (2½ pounds) of granules. In case the rate should be increased or decreased change the rate control adjustment and recalibrate.