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A 1967 GUIDE FOR - - -

CHEMICALS that CONTROL WEEDS . . .

By Weed Science Personnel

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.

The suggestions for chemical weed control contained in this circular are based on research results at the Nebraska Agricultural Experiment Stations and elsewhere.

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. BE ESPECIALLY CAREFUL WITH 2,4-D AND SIMILAR COMPOUNDS AROUND VEGETABLES, ORNAMENTALS, TREES, SHRUBS, AND OTHER BROADLEAF CROPS.

Extension Service

University of Nebraska College of Agriculture and Home Economics and U.S. Department of Agriculture

Cooperating

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

LARRY THE LABEL SAYS:

"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 95% of the removal chemical. BURN PAPER BAGS AND FIBER DRUMS. Stay out of the smoke

FIELD AND VEGETABLE CROPS—PREPLANT AND PREEMERGENCE

A 13-inch band application will reduce the total herbicide used in 40-inch rows by two thirds.

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, preemergence herbicides should 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 preemergence 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.

If you use Treflan plant only castorbeans, field beans, or soybeans the following year.

Forage from crops grown on land treated with Amiben, Ramrod, and Treflan should not be grazed or used for livestock feed.

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

Crop	Herbicide	Lb active ingredient[1] needed/A	Apply this amount commercial product/A	Application time	Remarks
Castorbeans	CDAA	5	25 lb Randox granules	Preemergence	Do not use on sandy soils. Incorporate with a rotary hoe. Randox controls mainly grassy weeds; Alanap–3 mainly broadleaf weeds. Handle Randox with care to avoid irritation.
	NPA	4	2 gal Alanap–3		
	EPTC	2	1⅓ qt Eptam	Preplant	Immediately incorporate by double disking or equivalent soil mixing.
	trifluralin	1	1 qt Treflan		
Corn	atrazine	2 to 3	2.5 to 3.75 lb Atrazine 80W	Preemergence	On sandy soil use only Atrazine and at 2 lb/A. Atrazine may not control fall panicum or crabgrass. Ramrod controls grasses primarily.
	CP31393	4 to 5	6.1 to 7.7 lb Ramrod 65W		
	2,4-D ester	1 to 1½	1 to 1½ qt[3]		
Field beans	EPTC	3	2 qt Eptam	Preplant	Immediately incorporate by double disking or equivalent soil mixing.
Onions	DCPA	10	13.3 lb Dacthal 75W or 20 lb Dacthal 50W	Preemergence	Incorporate 1″ deep at planting time. Later applications feasible if emerged weeds are destroyed prior to Dacthal application.
Potatoes	EPTC	3	2 qt Eptam	Preplant	Incorporate immediately.
	diphenamid	4	5 lb Dymid 80W or 8 lb Enide 50W	Preplant or Preemergence	Incorporation is beneficial.
Sorghum (These herbicides are for central and eastern Nebraska only)	atrazine	2 to 3	2½ to 3.75 lb Atrazine 80W	Preemergence	Do not use on sandy soils or soils low in organic matter. Heavy rains may leach atrazine and cause injury to sorghum. Atrazine may not control crabgrass and fall panicum.
	atrazine + norea	1 + 2	1¼ lb Atrazine 80W and 2½ lb Herban 80W		
Soybeans	amiben	3	6 qt Amiben	Preemergence	Incorporation may be beneficial.
	trifluralin	¾ to 1	¾ to 1 qt Treflan	Preplant	Immediately incorporate by double disking or equivalent soil mixing.
Sugar beets	pebulate	3 to 5	2 to 3⅓ qt Tillam	Preplant	Immediately incorporate into dry soil with hooded, power-driven incorporator to 1 to 2 inches. Use lower rate (3 lb/A) on sandy soils low in organic matter. *Tillam and Ro-Neet do not control kochia.*
	R-2063	3 to 5	2 to 3⅓ qt Ro-Neet		

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Crop	Herbicide	Lb active ingredient[1] needed/A	Apply this amount commercial product/A	Application time	Remarks
Tomatoes	diphenamid	4	5 lb Dymid 80W or 8 lb Enide 50W	Before or after seeding or after transplanting on weed-free surafce	Incorporation is beneficial.

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 prior to application and upward when ideal growth is limited by one or more factors.

Crop	Herbicide	Lb active ingredient[1] needed/A	Apply this amount commercial product/A	Application time	Remarks
Barley and spring wheat	2,4-D amine	½ to ¾	1 to 1½ pt[3]	5-leaf to early boot	Do not treat winter barley in the fall. Spray field pennycress and mustards as soon as good growing conditions occur in the spring.
	2,4-D ester	¼ to ½	½ to 1 pt[3]		
Corn	2,4-D amine	½ to 1	1 to 2 pt[3]	Before corn is 18″ high—over 18″ 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	¼ to ½	½ to 1 pt[3]		
Oats	2,4-D amine	½	1 pt[3]	6-leaf to flag leaf	Some injury may be expected at any stage with 2,4-D.
	MCPA	1	1 qt[3]		
Sorghum	2,4-D amine	½	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	¼	½ pt[3]		
Sugar beets	dalapon	2 to 4	2.7 to 5.4 lb Dowpon	Grassy weeds less than 2″ tall	For annual grasses. Use higher rate (4 lb/A) on grass taller than 2″.
Winter wheat	2,4-D amine	½ to ¾	1 to 1½ pt[3]	Before early boot	Do not spray winter wheat in the fall. Spray field pennycress and mustards as soon as good growing conditions occur in the spring.
	2,4-D ester	¼ to ½	½ to 1 pt[3]		

PASTURES, RANGES, AND FORAGE CROPS

Area or use	Herbicide	Lb active ingredient[1] needed/A	Apply this amount commercial product/A	Application time	Remarks
Alfalfa and birdsfoot trefoil seedlings	dalapon	2 to 3	2.7 to 4 lb Dowpon	2 to 4 weeks after alfalfa emerges when grass seedlings are less than 2″ tall	For annual grasses. Do not sell first year's crop or feed treated forage to dairy cows or animals being finished for slaughter. Can be mixed with 2,4-DB.
	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.
	EPTC	3	2 qt Eptam	Preplant	Immediately incorporate by double disking or equivalent soil mixing. Early legume injury may occur.
Cool-season grass seedlings	2,4-D	½ to ¾	1 to 1½ pt[3]	2- to 4-leaf stage	For broadleaf weeds.
Warm-season grass seedlings	2,4-D	¼ to ½	½ to 1 pt[3]		

[1] Refers to acid equivalent, phenol equivalent, or active material as applicable, calculated on a broadcast or total coverage basis.
[2] Retreatment may be necessary.
[3] Calculated on the basis of 4 lb/gal of active ingredient (the chemicals in a product that are responsible for the herbicidal effects). For other formulations see conversion table on page 7.

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Area or use	Herbicide	Lb active ingredient[1] needed/A	Apply this amount commercial product/A	Application time	Remarks
Warm-season grasses for seed	atrazine, diuron, or monuron	3	3.75 lb Atrazine 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	2,4-D	1	1 qt[3]	Rosette stage in fall or when weeds are small in spring	Withhold milk cows from treated areas for 7 days after application.
Perennial broadleaf weeds in pastures and ranges	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 treated areas for seven days after application.

NON-CROP AREAS

Area or use	Herbicide	Lb active ingredient[1] needed/A	Apply this amount commercial product/A	Application time	Remarks
Chemical mowing	paraquat or diquat	1	2 qt Paraquat or Diquat	Postemergence	Use enough water to insure good coverage. Add ½% wetting agent to spray solution.
Fence rows and roadsides (broadleaf weeds)	2,4-D	1	1 qt[3]	Weed height 2 to 6 inches	Repeat treatments may be necessary. Add 2,4,5-T at 1 lb/A for wild rose and horse nettle.
Irrigation ditchbanks	diuron or monuron	8	10 lb Karmex or Telvar	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. Agitation required.
	atrazine or simazine	6	7½ lb Atrazine 80W or Simazine 80W		
Soil sterilant for drives, storage areas, industrial sites, parking lots, fence lines, etc.	atrazine or simazine	10	12.5 lb Atrazine 80W or Simazine 80W	Follow manufacturer's recommendations	Complete control of annuals, biennials, and most perennials. Consider possible damage to nearby trees, shrubs, grass, crops, and possible movement of sterilant with water and wind before herbicides are leached into the soil. Granular formulations generally available.
	bromacil	5	6¼ lb Hyvar X		
	diuron or monuron	10 to 20	12.5 to 25 lb Telvar or Karmex		
	prometone	5	2½ gal Pramitol		
	Mixtures Atrazine + others Bromacil + others Chlorate + others Monuron + others Simazine + others	Follow manufacturer's recommendations with these combinations			

LAWN AND TURF WEEDS

Weed	Herbicide	Lb active ingredient[1] needed/A	Apply this amount commercial product/A	Application time	Remarks
Broadleaf weeds such as dandelion, ragweed, field bindweed, and plantain	2,4-D amine, dicamba, or silvex	1	1½ tbs[3]/1000 sq ft 2,4-D, Banvel D, Silvex or mixtures (Use enough water to insure good coverage)	Fall or spring (Do not spray from May 1 to Sept. 15)	AVOID drift on desirable broadleafs. DO NOT use ester formulations of 2,4-D as damaging fumes drift unpredictable distances. Spray when calm. Check with neighbors before spraying. Avoid spraying Banvel D around flowers, shrubs, and trees.
Chickweed, henbit, violets, and knotweed	dicamba or silvex	1	1½ tbs[3]/1000 sq ft Banvel D or Silvex	Fall or spring (Do not spray from May 1 to Sept. 15)	Use enough water to insure good coverage. Avoid spraying Banvel D around flowers, shrubs, and trees.
Crabgrass, foxtail, and other annual grasses	Follow manufacturer's recommendations with Azak, Betasan, Dacthal, Tupersan and Zytron			Preemergence to weeds in the spring	Use only on established grass. Rake lawn prior to application and water in.

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Weed	Herbicide	Lb active ingredient[1] needed/A	Apply this amount commercial product/A	Application time	Remarks
Crabgrass	AMA or DMA	Follow manufacturer's recommendations with these organic arsonates		Postemergence	Repeat treatment every 7 days for 2 or 3 applications. Also effective on foxtail. May temporarily discolor bluegrass.
	kerosene		1 qt/100 sq ft	Postemergence, 2 to 4 leaves on crabgrass	Use white kerosene. Do not dilute. Apply when temperature is below 90° F.
Smooth bromegrass	dicamba	2	3 tbs[3]/1000 sq ft Banvel D	Fall or spring (Do not spray from May 1 to Sept. 15)	Thoroughly wet all plants. Repeat treatments may be needed. Avoid spraying Banvel D around shrubs, flowers, and trees.
White clover	dicamba, silvex, or 2,4-5-T	1	1½ tbs[3]/1000 sq ft Banvel D, Silvex, 2,4,5-T or mixtures		

TROUBLESOME WEEDS AND WOODY PLANTS

Follow-up treatments are necessary to kill escaped established plants and new seedlings

Weed	Herbicide	Lb active ingredient[1] needed/A	Apply this amount commercial product/A	Application time	Remarks
Bursage, Skeletonleaf and woollyleaf (Bur ragweed)	2,4-D	2	2 qt[3] emulsifiable formulations	During June[2]	Same as for field bindweed except amine formulations less effective. If soil moisture conditions are poor, use oil-water emulsions as a carrier.
	picloram	2	1 gal Tordon 22K	Fall or spring on vigorous growth[2]	See remarks for Canada thistle.
	2,3,6-TBA as listed for field bindweed.				
Canada thistle	2,4-D	2	2 qt[3]	Fall (rosette) and spring (early bud)[2]	Same as for field bindweed.
	picloram	2	1 gal Tordon 22K	Fall or spring on vigorous growth[2]	Do not disturb for 1 to 2 weeks after treatment. Do not plant to grass crops for 2 years or broadleaf crops for 3 years.
	2,3,6-TBA as listed for field bindweed control.				Do not use in wet areas.
Cottonwood, willows, and Chinese elm	2,4-D ester	2 to 3	2 to 3 qt[3]	Full foliage[2] (early June)	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 run-off.
Downy brome	atrazine	2	2.5 lb Atrazine 80W	Preemergence (fall or spring prior to April 1)	Use only in waste areas such as fence rows and ditchbanks. Do not use on cropland. Use sufficient water to insure good coverage.
	atrazine+amitrole monuron+amitrole	1+½ 1+½	1.25 lb Atrazine 80W or Telvar plus 1 lb of Amino Triazole or Weedazol	Postemergence in spring prior to April 10	
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.
	picloram	2	1 gal Tordon 22K	Fall or spring on vigorous growth[2]	See remarks for Canada thistle.
	2,3,6-TBA	20	1½ lb/sq rd Granular TBA or ½ pt/sq rd Benzac 1281 or Trysben 200,	Fall or spring[2]	Do not disturb except for shallow incorporation. Fall application more effective. High summer temperatures reduce effectiveness. Follow up treatments with 2,4-D applications on seedlings and escapes.

[1] Refers to acid equivalent, phenol equivalent, or active material as applicable, calculated on a broadcast or total coverage basis.
[2] Retreatment may be necessary.
[3] Calculated on the basis of 4 lb/gal active ingredient (the chemicals in a product that are responsible for the herbicidal effects). For other formulations see conversion table on page 7.

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Weed	Herbicide	Lb active ingredient[1] needed/A	Apply this amount commercial product/A	Application time	Remarks
Hoary cress	2,4-D	2 to 4	½ 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.
	2,3,6-TBA as listed for field bindweed control.				
Hemp dogbane	2,4-D ester	1	1 qt[3]	Bud stage[2]	Use lower rates in crops.
Johnsongrass	dalapon	5	6¾ lb Dowpon	8 to 12″ new growth or regrowth[2]	Repeat treatment 3 times, 10 to 20 days apart.
	TCA	80	100 lb Sodium TCA	Early spring[2]	Use enough water to insure good coverage. Retreat escaped plants.
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.
	dicamba	10	2 oz Banvel D/sq rd	Fall or spring[2]	Same as for 2,3,6-TBA.
	picloram	2	1 gal Tordon 22K	Fall or spring on vigorous growth[2]	See remarks for Canada thistle.
	2,3,6-TBA as listed for field bindweed control.				
Milkweed, common	amitrole	4	8 lb Amino Triazole or Weedazol	Bud to bloom stage[2]	Use enough water to insure good coverage.
	picloram	2	1 gal Tordon 22K	After emergence	See remarks for Canada thistle.
Musk thistle	2,4-D	1½ to 2	1 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.
Poison ivy	amitrole		2 tbs Amino Triazole or Weedazol/gal water	Full foliage (June)[2]	Thoroughly wet all vegetation.
	2,4,5-T or 2,4-D+2,4,5-T		2 tbs[3] per gal of water		
Puncture vine	2,4-D ester	1	1 qt[3]	Pre-bud stage most effective	Mature burs not affected by 2,4-D.
Ragweed	2,4-D	1	1 qt[3]	Early summer[2]	Follow-up treatments may be necessary.
Russian knapweed	2,4-D	2	2 qt[3] emulsifiable formulations	Early bud stage[2]	Same as for field bindweed except amine formulations less effective.
	picloram	2	1 gal Tordon 22K	Fall or spring on vigorous growth[2]	See remarks for Canada thistle.
	2,3,6-TBA as suggested for field bindweed.				
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 or green)	2,4-D ester	1	1 qt[3]	4 to 8 inches new growth (June)[2]	Use sufficient water to insure good coverage.
Shattercane	EPTC	3	2 qt Eptam	10 days prior to corn planting	Incorporate immediately by double disking or equivalent soil mixing. Some crop injury may result from Eptam or Treflan. Plant corn on the land the year following Simazine treatment.
	simazine	4	5 lb Simazine 80W	Preplant to corn	
	trifluralin	1	1 qt Treflan	Preplant on soybeans	
Swamp smartweed (Tanweed)	2,4-D ester	1	1 qt[3]	When growing vigorously[2]	Controls top growth principally. Repeat treatment necessary.
	picloram	2	1 gal Tordon 22K	Fall or spring on vigorous growth[2]	See remarks for Canada thistle.
Western Snowberry (Buckbrush)	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.
Yucca	silvex	2	2 qt[3]	June[2]	Use diesel as a carrier.

TREES AND SHRUBS

Herbicides are an effective and efficient way of controlling weeds in tree and shrub plantations and in nursery line-out beds. Herbicides listed are capable of causing tree injury. However, they can be used safely. Rates of application should be strictly observed. Herbicides are used for control of weeds near the trees where machine cultivation is difficult or impossible. They may be applied as a circular band around the tree trunk or in bands along the tree row. A 40-inch band, 20 inches on either side of the tree row, has proved satisfactory in row plantations. Conventional machine cultivation or mowing should be used to control weeds between the rows.

Preemergence herbicides rely on moisture in the form of precipitation or sprinkler irrigation to incorporate the herbicide into the soil surface for effective weed control. Tree injury is sometimes experienced on sandy soils or those low in organic matter if heavy rainfall occurs shortly after herbicide application. The minimum herbicide rate listed is recommended for sandy soils.

Herbicides should be applied only after the trees are planted. For most of the preemergence herbicides listed here, only one application at the beginning of the growing season is recommended. Granular formulations of herbicides generally are not as satisfactory as spray formulations. In new plantations the soil should be firmly packed around the trees and free of clods and surface irregularities. A depression along the tree row caused by a mechanical tree planter may result in a dangerous concentration of chemical near the tree after a heavy rain.

ORCHARDS

Crop	Herbicide	Lb active ingredient[1] needed/A	Apply this amount commercial product/A	Application time	Remarks
Apples, peaches, and pears	dalapon	1 lb Dowpon in 15 gal water used as a wetting spray		Postemergence, grass 1 to 10″ tall	Grass control only. Use only on trees over 4 years old. KEEP SPRAY OFF TREE FOLIAGE.
Apples, cherries, grapes, pears and raspberries	simazine	2 to 4	2.5 to 5 lb Simazine 80W	Preemergence to weeds	Use lighter rate (2 lb/A) on sandy soils. Apply a 20″ band on each side of the row. Use on trees established 1 or more years. Use only on grapes 3 years or older.

WINDBREAKS, CONIFERS, FOREST PLANTATIONS, ORNAMENTALS, AND NURSERY LINERS

Crop or use	Herbicide	Lb active ingredient[1] needed/A	Apply this amount commercial product/A	Application time	Remarks
Trees	dalapon	1 lb Dowpon in 15 gal water used as a wetting spray		Postemergence, grass 1 to 10″ tall	Grass control only. Use only on trees established 1 or more years. KEEP SPRAY OFF TREE FOLIAGE
	paraquat or diquat	½ to 1	1 to 2 qt Paraquat or Diquat	Postemergence	Non-selective contact herbicides. Use sufficient water and wetting agent to cover weed foliage. KEEP SPRAY OFF TREE FOLIAGE
Conifers, honey locust, and green ash	diuron	2 to 4	2.5 to 5 lb Karmex	Preemergence to weeds	Use lighter rate on sandy soils. Apply a 20″ band on each side of tree row after trees are planted. Some injury to trees may result if soils are low in organic matter.
Trees and shrubs	simazine	2 to 4	2.5 to 5 lb Simazine 80W		
	diphenamid	4 to 6	5 to 7½ lb of Dymid 80W		

CONVERSION TABLE

Pounds of active ingredient 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	1⅓	2⅔
3.34	⅗	1⅕	2⅖
4.00	½	1	2
6.00	⅓	⅔	1⅓

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

[2] Retreatment may be necessary.

[3] Calculated on the basis of 4 lb/gal of active ingredient (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.

Thoroughly clean all equipment immediately after use.

Sprayers

The number of gallons per acre a sprayer will discharge depends upon the ground speed, nozzle pressure, spacing of the 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 ¼ or ½ 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 apply 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 x 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 ¼ of the total land area; a 10″ band on 30″ rows covers ⅓ of the total land area; a 13″ band on 40″ rows covers approximately ⅓ 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 ⅓ of the total land area. Your rate of application will be ⅓ of three or 1 pound per acre. Since amiben is formulated 2 pounds of active ingredient per gallon, you will use ½ gallon of chemical to obtain the 1 pound of amiben. Therefore, your mixture ratio should be 9½ gallons of water to ½ 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.