

JANUARY 1977

PEST MANAGEMENT SERIES 5

Chemical Control of Brush and Weeds in Forests and Non-Crop Areas

EXTENSION DIVISION



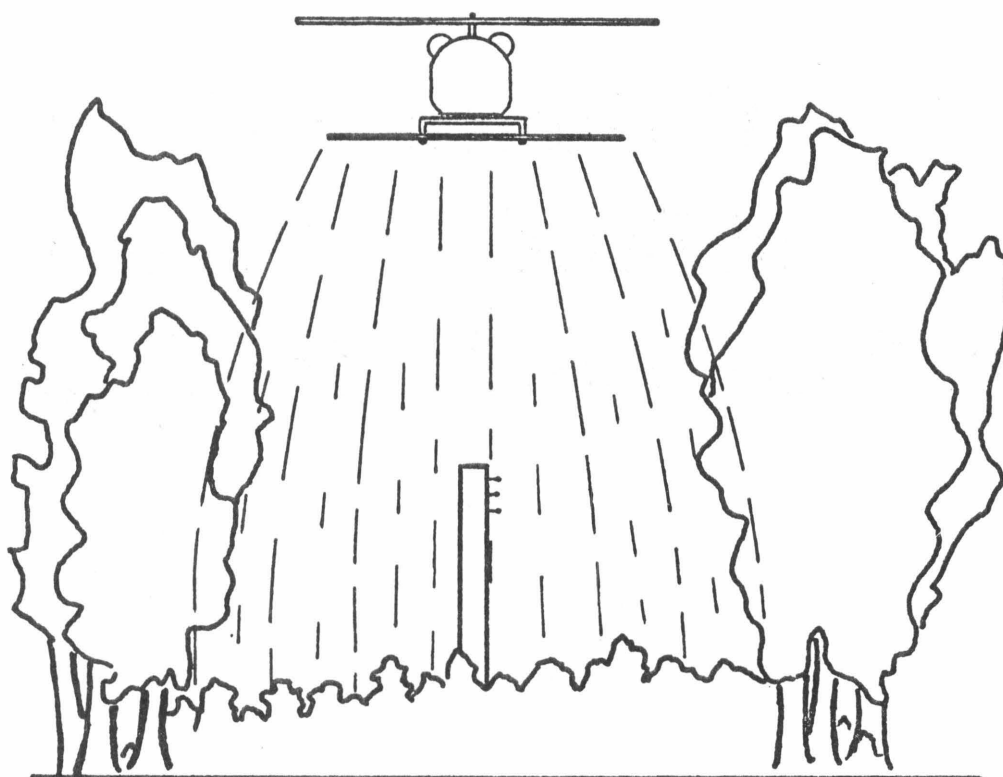
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KEYS TO PROPER USE OF PESTICIDES

1. Read the label on each pesticide container before each use. Follow instructions to the letter; heed all cautions and warnings, and note precautions about residues.
2. Keep pesticides in the containers in which you bought them. Put them where children or animals cannot get to them, preferably under lock and away from food, feed, seed, or other material that may become harmful if contaminated.
3. Dispose of empty containers in the manner specified on the label.

SEE YOUR DOCTOR IF SYMPTOMS OF ILLNESS OCCUR DURING OR AFTER USE OF PESTICIDES.



Profile of aerial spraying on utility lines below 40 feet.

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BRUSH AND UNWANTED FOREST TREES

W. E. Chappell and J. S. Coartney

The treatments given in this section are not for use in crop land unless otherwise indicated under a given crop section. Registration for use of 2,4,5-T on food crops, around homes, recreational areas, ponds and ditch banks has been canceled. These actions do not eliminate registered use of 2,4,5-T for control of weeds and brush on range, pasture and forest or rights-of-way and other non-crop land.

BRUSH CONTROL

Problem and Application Technique	Chemical and Application Rate	Remarks
FOLIAGE SPRAY	AMS 65 lb + 6 oz spreader-sticker/100 gal of water	Wet stems and foliage thoroughly. Density of brush will determine rate/A. Use on all species during June and July. May be used near susceptible crops.
High volume application with hand gun or fixed nozzle		
Ground applications often use volumes ranging from 100-500 gpa. Our research has shown good results with volumes as low as 30-60 gpa if uniform coverage can be obtained.	2,4-D and/or 2,4,5-T* 8-12 lb ai in 30-60 gal of water/A	Apply uniformly over top of brush as a coarse spray. Pine, cedar, and ash are resistant.
	Krenite 6-12 lb/A (1.5-3 gal in 50-300 gal of water)	Apply in late summer or early fall (during the 2 month period prior to leaf coloration) to species listed on label. No "brown-out" occurs. Susceptible species fail to leaf out the next spring and subsequently die. If rainfall occurs within 24 hours, effectiveness will be reduced.
	picloram + 2,4-D (Tordon 101 or Amdon 101) 1 gal/100 gal of water	Apply uniformly over top of brush as a coarse spray. Use on all species during June and July. DO NOT APPLY WITHIN 100' OF DESIRABLE PLANTS OR ALLOW PICLORAM OR DICAMBS TO CONTAMINATE WATER USED FOR IRRIGATION OR OTHER DOMESTIC PURPOSES. May move down slopes for considerable distance.
	dicamba 1 lb + 2,4-D or 2,4,5-T* 2 lb/100 gal water	
Low volume application to foliage	2,4-D + 2,4,5-T* (invert emulsion) 8-12 lb/A in 16-24 gal of water	Use aerial or ground equipment such as Amchem Spra-Disk or Rhodia Visko-Rhap system. Use on all hardwood species during June or July.
	picloram + 2,4-D (Tordon 101 or Amdon 101) 1-3 gal in 10-20 gal/A	Apply during the growing season with aerial equipment. Use either drift control agent or equipment that prevents drift by control of droplet size. DO NOT APPLY WITHIN 100' OF DESIRABLE PLANTS OR ALLOW PICLORAM TO CONTAMINATE WATER USED FOR IRRIGATION OR OTHER DOMESTIC PURPOSES. May move down slopes for considerable distance.

* 2,4,5-T is not to be used around the home, recreational areas, ponds or ditch banks, or similar sites.

Brush Control (Cont'd)

Problem and Application Technique	Chemical and Application Rate	Remarks
FOLIAGE SPRAY Low volume application to foliage	2,4-D + 2,4,5-T* or 2,4,5-T 6-12 lb + MSMA 3 1/3 lb ai (1/2 gal of 6 2/3 lb/gal MSMA) in 10-30 gal of water/A	Apply during the growing season with aerial equipment. Use either drift control agent or equipment that prevents drift by control of droplet size.
	dicamba 3 lb + 2,4-D or 2,4,5-T* (LVE) 4 lb in 10-30 gal of water/A	Same as 2,4-D + 2,4,5-T under low volume application. DO NOT APPLY WITHIN 100' OF DESIRABLE PLANTS OR ALLOW TO CONTAMINATE WATER USED FOR IRRIGATION OR OTHER DOMESTIC PURPOSES.
	Krenite 6-12 lb/A (1.5-3 gal in 10-30 gal of water/A)	Apply with aerial equipment in the late summer or early fall (during the 2 month period prior to leaf coloration) to species listed on the label. No "brown-out" occurs. Susceptible species fail to leaf out the next spring and subsequently die. If rainfall occurs within 24 hours, effectiveness will be reduced.
DORMANT STEMS High volume application	2,4-D + 2,4,5-T* (LVE) 6 lb/100 gal oil	Wet thoroughly all of the stems including the root collar. Density of brush will determine rate/A. Use on all species between October and April. Poor control of black locust, sumac, sassafras, and other root suckering species. Up to 85 gal of water may be substituted for oil if indicated on the label.
	picloram + 2,4,5-T* (Tordon 155) 1-3 gal/100 gal oil or dicamba (OS) 1-3 lb + 2,4,5-T* 2-6 lb/100 gal oil	Apply as a broadcast treatment to dormant stems. Good control of most species. DO NOT APPLY WITHIN 100' OF DESIRABLE PLANTS OR ALLOW PICLORAM TO CONTAMINATE WATER USED FOR IRRIGATION OR OTHER DOMESTIC PURPOSES. May move down slope for considerable distance.
BASAL TREATMENT Low volume application	2,4-D + 2,4,5-T* (LVE) or 2,4,5-T (LVE) 12-24 lb/100 gal oil	Wet thoroughly the lower 12" of stem. Density of brush will determine rate/A. Use on all species any time of year. Poor control of black locust, sassafras, and other root suckering species. Up to 85 gal of water may be substituted for oil if indicated on the label.
	picloram + 2,4,5-T* (Tordon 155) 3 gal/100 gal oil or dicamba (OS) 3 lb + 2,4,5-T* 12 lb/100 gal oil	Wet thoroughly the lower 12" of stem. Density of brush will determine rate/A. Use on all species any time of year. DO NOT APPLY WITHIN 100' OF DESIRABLE PLANTS OR ALLOW CONTAMINATION OF WATER USED FOR IRRIGATION OR DOMESTIC PURPOSES. May move down slope.

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Brush Control (Cont'd)

Problem and Application Technique	Chemical and Application Rate	Remarks
SOIL APPLICATION (Dry material)	karbutylate 12-16 lb ai/A (Tandex 80W 20-25 lb; Tandex 10G 120-160 lb) or picloram 5-8 lb ai/A (Tordon 10K 50-80 lb)	Apply on all species during any season at base of clumps. Any tree with roots extending into the treated area may be killed. DO NOT APPLY WITHIN 100' OF DESIRABLE PLANTS OR ALLOW MATERIAL TO CONTAMINATE WATER USED FOR IRRIGATION OR DOMESTIC PURPOSES. Picloram may move down slope for considerable distance.

FOREST TREES

Problem and Application Technique	Chemical and Application Rate	Remarks
TREES (Over 3" diameter)	2,4-D and/or 2,4,5-T* (ester) 16 lb/100 gal oil	Apply to overflowing in ax frills about waist high that completely girdle the tree. Use on all species any time of the year except maple when dormant. AMS is very corrosive to metal.
Frill treatment	AMS (solution) 8 lb/2 gal of water	
Spaced frill treatment	2,4-D and/or 2,4,5-T* (Amine) 1 ml from 4 lb gal (ae) ----- picloram + 2,4-D (amine) 1 ml from 2.54 lb gal (ae) ----- dicamba 1 ml from 4 lb gal (ae) diluted 1:1 with water	Apply 1 ml in each ax cut about waist high around the tree and spaced 2" edge to edge. 2,4-D and/or 2,4,5-T are more effective May to August on all species. Picloram + 2,4-D or dicamba effective any time on all species except maple when dormant. DO NOT ALLOW PICLORAM TO CONTAMINATE WATER USED FOR IRRIGATION OR OTHER DOMESTIC PURPOSES. DO NOT APPLY PICLORAM OR DICAMBA NEAR DESIRED SPECIES.
Frill treatment with notches	AMS (dry crystal) 1 table-spoon (95% active per notch)	The dry crystals can be placed directly in notches spaced 4-6" around base of tree. Notches are made by two downward ax cuts, one above the other, prying out the chip. Use on all species any time of the year.
Spaced injector treatment	2,4-D and/or 2,4,5-T* (amine) 1 ml from 4 lb gal (ae) ----- picloram + 2,4-D (amine) 1 ml from 2 1/2 lb gal (ae) dicamba 1 ml from 4 lb gal (ae) diluted 1:1 with water ----- 2,4-D + 2,4,5-T* (ester) 40 lb/100 gal oil	Use a special tree injector calibrated to deliver 1 ml per cut. Space cuts 2" apart (edge to edge) at base of tree. 2,4-D and/or 2,4,5-T more effective May to August on all species. Picloram + 2,4-D or dicamba effective any time on all species except maple when dormant. DO NOT ALLOW PICLORAM TO CONTAMINATE WATER USED FOR IRRIGATION OR OTHER DOMESTIC PURPOSES. Apply to overflowing in overlapping cuts made with a special tree injector. Use on all species any time of the year.

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SITE PREPARATION

Problem and Application Technique	Chemical and Application Rate	Remarks
ALL WOODY SPECIES IN FUTURE PLANTING SITE	2,4,5-T* 1b ai in 1 gal oil and 8 gal water/A	Apply aerially in June, July, or August. If permitted, burn in winter to eliminate dead debris.

PINE RELEASE

Problem and Application Technique	Chemical and Application Rate	Remarks
PINE RELEASE FROM BRUSH OR HARDWOOD TREES Foliage treatment	2,4,5-T* (ester) 2 lb/A/2 qt oil + 4 gal of water	Apply aerially in August. Pines are hardened by August and will be damaged less at this time by this treatment. Use on all hardwood species.

STUMP TREATMENT

Problem and Application Technique	Chemical and Application Rate	Remarks
STUMPS OF TREES AND BRUSH Stump treatment	2,4-D + 2,4,5-T* (ester) 12 lb/100 gal oil ----- AMS (dry crystals) 1 oz per inch stump diameter	Spray to wet thoroughly the cut surface at the junction of the wood and bark, sides, root collar and exposed roots of stumps. For best results, application should be made soon after cutting. Expect poor root sucker control of black locust, sumac, sassafras, and other root suckering species. Use on all species any time of the year.

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NONSELECTIVE CHEMICAL WEED CONTROL RECOMMENDATIONS FOR NON-CROP LAND

W. E. Chappell and J. S. Coartney

CAUTION! All use recommendations of herbicides as listed under this category must be regarded as non-selective. Therefore, do not use in crop areas except as shown under SELECTIVE CHEMICAL WEED CONTROL RECOMMENDATIONS. When treating land that will later be used to grow crops, observe all label precautions with respect to critical dosages, waiting intervals before cropping, and residue tolerances in the crops. Avoid spray drift onto crops and ornamentals to prevent injury and illegal residues. Do not apply soil sterilants within the root development area of adjoining crops, ornamentals or other desirable species, also avoid use in areas where there is danger of chemical runoff.

A. MIXTURE OF ANNUAL GRASSES AND BROADLEAVED WEEDS

Apply these herbicides during the growing season as a foliar spray.

Herbicide	Application Rate ai/A	Remarks
amitrole + simazine (Amizine)	1.05 lb + 3.15 lb (7 lb/A Amizine/50-100 gal)	This treatment provides both foliar kill and some residual control of annual weeds.
amitrole + wetting agent	2 lb + 1/2 pt/100 gal	Spray to wet all foliage volume of spray/acre will depend on height and density of growth. Apply when weeds are 3-4" high. Repeat applications when additional weeds appear.
2,4-D amine + dalapon + wetting agent	2 lb (ae) + 6 lb + 1/2 pt/ 100 gal	
diesel oil	Follow weed oil recommendations but increase amount of oil by 10 gal and dinoseb by 1 pt.	
glyphosate (Roundup)	1-1.5 lb (1-1.5 qt)	Apply in 20-30 gallons of water per acre. Glyphosate is slow acting and may require 5-10 days before visible results occur. If rainfall occurs within 6 hours, effectiveness may be reduced. Do not use with galvanized spray equipment. Use of mechanical agitation or additional wetting agent will cause excessive foaming. Do not allow spray drift to contact desirable plants. Glyphosate leaves no soil residue. <u>Industrial and nonagricultural use only.</u>
weed oil	Emulsion of oil and water (15-50 gal oil plus water to make 100 gal of mix). Agitate to maintain emulsion.	Use lower rate of oil on young, tender weeds; increase amount of oil for older, larger weeds. Add 1 qt dinoseb per 100 gal of mix when air temperature is below 60°F at time of spraying and to improve kill of broadleaved weeds. Volume of spray per acre will depend on height and density of growth.

Nonselective

A. MIXTURE OF ANNUAL GRASSES AND BROADLEAVED WEEDS (Cont'd)

Apply these herbicides when they will be leached into the soil by precipitation or by supplemental irrigation.

Herbicide	Application Rate ai/A	Remarks
atrazine bromacil diuron karbutylate monuron simazine	2.4-4.8 lb/50-100 gal	Apply before or just after weeds emerge. Adequate rain-fall must follow to move chemicals into the root zone of weeds. Use lower volume for boom spraying, higher volume for offset nozzles. Continuous agitation of spray mixture is necessary to avoid settling out in the spray tank. Nozzle screens of 50 mesh are desirable. Finer screens may clog. Where weeds are up, add 1 lb amitrole/A to simazine, monuron, and diuron; add to atrazine and bromacil if weeds are over 6" high. Do not apply near desirable plants.
borate and mixture of borate with other herbicides, e.g., chlorate, monuron, 2,4-D, bromacil, etc.	variable depending on the formulation	Several products are available. Follow manufacturer's directions.

B. SPECIFIC PERENNIAL WEEDS

(See also SOIL STERILIZATION below for general nonselective control, including perennial weeds).

Weed	Chemical Rate ai/A	Remarks
Bermudagrass (wiregrass)	dalapon 5-7 lb + wetting agent 1-2 pt	Apply any time when grass is 4-6" tall and actively growing. Repeat at 10 to 20-day intervals for 2 or 3 applications. The area should not be disturbed for at least 3 days after treatment but tillage after this period will improve control and hasten the dissipation of the herbicide. <u>Spot Treatment:</u> Use 1 lb/5 or 10 gal of water and spray to wet the foliage. Dalapon residue should be gone 20 days after the last application.
	TCA 50-100 lb/50-100 gal	Apply during growing season. Late fall or early spring applications on treatments right after plowing or tilling are often most effective. Either very low rainfall or excess leaching may reduce effectiveness.
	borate and mixture of borate and other herbicides, e.g., chlorate, monuron, 2,4-D, bromacil, etc. Variable depending on the formulation	Several products are available. Follow manufacturer's directions.
	glyphosate 2-4 lb (Roundup 2-4 qt)	Best control is obtained when treatment is made at late stages of growth but prior to seed head emergence. See remarks for glyphosate under annual grasses and broadleaf weeds above.

B. SPECIFIC PERENNIAL WEEDS (Cont'd)

Herbicide	Application Rate ai/A	Remarks
Canada thistle	amitrole or amitrole-T or 2,4-D 2-3 lb/100 gal	Apply in early summer when thistles are in early bud to early bloom stage. Respray new growth at very early bud stage. Several retreatments may be necessary for eradication. Thoroughly wet all foliage and stems.
	picloram 1/2 lb/100 gal	See above comments. Avoid drift to neighboring ornamental or crop plants. Soil effects may persist for one year or longer.
	dicamba 4 lb/100 gal	
Honeysuckle	2,4-D or 2,4-D + 2,4,5-T* 2-3 lb/100 gal	Apply in spring or summer when plants are in full leaf and actively growing. Thoroughly wet all foliage and stems. Density of cover will determine volume of spray per acre. Spot treat regrowth as required.
Johnsongrass	dalapon 5-10 lb + wetting agent 1-2 qt/100 gal	Apply any time when grass is 8-16" tall and actively growing. Repeat at 10 to 20 day intervals for 2 or 3 applications. The area should not be disturbed for at least 3 days after treatment but tillage after this period will improve control and hasten the dissipation of the herbicide. <u>Spot Treatment:</u> Use 1 lb/5 or 10 gal of water and spray to wet the foliage.
	MSMA or DSMA 3-5 lb/50-100 gal	Weed control is most effective when air temperature is 70°F or above. Some commercial products are formulated with wetting agent. If not, add surfactant at 1 to 2 qt/100 gal. Treat any time when grass is growing vigorously. If regrowth occurs, reapply. For complete kill, 3 to 5 applications may be required.
	TCA 100-150 lb/50-100 gal	Apply during growing season. Late fall or early spring applications on treatments right after plowing or tilling are often most effective. Either very low rainfall or excess leaching may reduce effectiveness. These rates will sterilize the soil for 6 to 9 weeks during summer months.
	borate and mixture of borate with other herbicides, e.g., chlorate, monuron, 2,4-D, bromacil, etc. Variable depending on the formulation	Several products are available. Follow manufacturer's directions.
	glyphosate 1-2 lb (Roundup 1-2 qt)	Best control is obtained when treatment is made at late stages of growth but prior to seed head emergence. See remarks for glyphosate under annual grasses and broadleaf weeds above.

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Nonselective

Weed	Chemical Rate ai/A	Remarks
Kudzu	2,4,5-T* (LVE) 2-6 lb/100 gal of water	Apply May 15-June 15, when plants are in full leaf and actively growing. Thoroughly wet all foliage and stems. Retreat at approximately 6-week intervals as needed.
	2,4,5-T* (LVE) 4-6 lb/100 gal oil	Dormant cane spray. Thoroughly wet all stems to ground line during winter months.
Milkweeds	amitrole or amitrole-T 2-3 lb/100 gal	Apply in early summer when weeds are in early bud to bloom stage. Thoroughly wet all foliage and stems. Retreat as needed.
Mugwort (Wild Chrysanthemum)	dichlobenil 6-8 lb or 5-6 lb (incorporated)	Use granular formulation only. Apply to soil surface, nonincorporated treatments from November 1-January 1; incorporated treatments may be in late fall or spring (before May 1).
	2,4-D (LVE) 5 lb + fenac (EC) 3 lb/30-60 gal	Apply in early spring when mugwort is less than 4" tall.
Nutsedge (nutgrass)	EPTC 6 lb/30-60 gal	Apply any time after existing stands of nutsedge have been destroyed by tillage. Mix into the soil 6" deep immediately after spraying by cross discing or use of a power driven rotary tiller. Will suppress nutsedge for 8 to 12 weeks.
	2,4-D 1-2 lb/30-60 gal	Make first application when nutsedge is 8" tall, completely wetting all leaves. Repeat at 3-week intervals or when regrowth reaches 4-6". Several retreatments may be required for eradication.
Poison ivy	amitrole or 2,4-D or 2,4,5-T* or 2,4-D + 2,4,5-T 2-3 lb/100 gal	Apply in spring or summer when plants are in full leaf and actively growing. Thoroughly wet all foliage and stems. Density of cover will determine volume of spray per acre. Spot treat regrowth as required.
	AMS (ammonium sulfamate) 75 lb/100 gal	
Quackgrass	amitrole 4 lb/50 gal amitrole-T 2 lb/50 gal	Spray when vigorous young growth is 4-6" tall. Plow when plants appear white, usually 10-14 days after treatment. Spot treat any green growth.
	atrazine 4 lb/20-40 gal	Treat in fall or spring. Leave land undisturbed until just prior to spring plowing. Split applications of 2 to 2 1/2 lb/A in fall and/or spring before and after plowing are also effective. Cultivation subsequent to herbicide treatment further enhances control.

*2,4,5-T is not to be used around the home, recreational areas, ponds or ditch banks, or similar sites.

Weeds	Chemical Rate ai/A	Remarks
Quackgrass (Cont'd)	dalapon 10-15 lb + wet- ting agent 1-2 pt/30-60 gal	Treat in early fall or early spring when grass is actively growing and 6-12" tall. Repeat at 10-20 day intervals for 2 or 3 applications. The area should not be disturbed for at least 3 days after treatment but tillage after this period will improve control and hasten the dissipation of the herbicide. <u>Spot Treatment:</u> Use 1 lb/5 or 10 gal of water and spray to wet the foliage.
	dichlobenil 6-8 lb or 5-6 lb (incorporated)	Use granular formulation only. Apply to soil surface, nonincorporated treatments from November 15-January 1; incorporated treatments may be made in late fall or spring (before May 1).
	MSMA 2-4 lb + wetting agent (already included in some formulations) 1-2 pt/30-60 gal	Make first application when quackgrass is 4-6" tall. completely wetting all foliage. Respray new growth as often as necessary when it reaches 4-6".
	TCA 75-100 lb/50-100 gal	Apply during growing season. Late fall or early spring applications on treatments right after plowing or til- ling are often most effective. Either very low rain- fall or excessing leaching may reduce effectiveness. These rates will sterilize the soil for 6-9 weeks dur- ing summer months.
	glyphosate 2-4 lb (Roundup 2-4 qt)	Best control is obtained when treatment is made at late stages of growth but prior to seed head emer- gence. See remarks for glyphosate under annual grasses and broadleaf weeds above.

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Nonselective

C. SOIL STERILIZATION

Soil sterilant chemicals, by definition, render the soil incapable of supporting plant growth for varying periods. The effect may be temporary, as with fumigants, or for an extended period (semi-permanent). In either case, the action is nonselective at rates specified for use as soil sterilants. Therefore, do not apply within the root development area of adjoining crops or desirable species. Do not use in crops or where there is danger of chemical runoff. NOTE! Since effectiveness varies considerable with the weed species, degree of infestation, soil and environmental conditions, several herbicidal materials and a range of rates are provided to allow selection of product and dosage based on specific need.

Lower rates (A) apply to annuals, biennials, shallow rooted perennials, and seedling perennials;
Higher rates (B) apply to established deep rooted and other hard-to-kill perennials. Read and follow directions on the label for further details.

Herbicide	Application Rate ai/A	Remarks
methyl bromide	870 (2 lb/100 sq ft)	Soil fumigant. Apply in concentrated form under vapor proof cover, when soil is moist, but not wet, and in good tilth. Remove cover after 24 to 48 hours. <u>WARNING! METHYL BROMIDE IS POISONOUS!</u>
amitrole + simazine (Amizine)	(A) 1 + 3 (7 lb product) (B) 3 + 9 (21 lb product)	Early growth to first bloom. Gives longer lasting control than amitrole alone, but a single application will not kill all deep rooted perennials.
borate, sodium	1300-5200	Apply broadcast as soil treatment.
borate mixtures with sodium chlorate and/or other chemicals	variable	Follow instructions on the label. Apply as a spray on early growth to first bloom or broadcast as a soil treatment.
bromacil	(A) 3-6 (B) 10-25	If dense growth is present, results will be improved if vegetation is removed prior to treatment.
chlorate, sodium	(A) 300-600 (B) 700-1300	Spray on foliage or use as broadcast soil application. CAUTION: Mixtures of sodium chlorate and organic matter, such as clothing or dry vegetation are highly INFLAMMABLE!
chlorate mixtures with borates or other chemicals	variable	Follow instructions on the label. Fire hazard usually less than pure sodium chlorate but caution still is necessary.
diuron or monuron	(A) 5-20 (B) 20-80	Diuron gives somewhat longer soil soil sterility. Monuron is more effective on deep rooted weeds.
karbutylate (Tandex)	(A) 3-6 (B) 15-30	Use according to label directions.
monuron-TCA	(A) 20-40 (B) 40-60	Make soil applications in late fall or winter. Provides some contact activity when weeds are young and succulent.

Herbicide	Application Rate ai/A	Remarks
prometone	(A) 10-15 (B) 20-60	Mix in water or oil. Provides quicker contact kill of top growth with oil. Apply to early growth up to first heading.
simazine or atrazine	(A) 5-20 (B) 20-40	Simazine requires more precipitation for effective root kill, and remains effective in the soil longer. This treatment will not control johnsongrass.

SOIL STERILANTS ARE VERY POTENT
PLANT KILLERS AND SHOULD NOT BE USED
AROUND THE HOME GROUNDS OR NEAR DESIRABLE PLANTS.

