

GRASS ROADSIDE VEGETATION MANAGEMENT

Tim R. Murphy, Extension Agronomist - Weed Science

SITE	HERBICIDE FORMULATION	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
		AMOUNT OF FORMULATION	ACTIVE INGREDIENT	
<p>In portions of the United States, numerous weed species have developed resistance to members of the sulfonylurea herbicide family (e.g. Telar, Oust, Escort). Sulfonylurea urea resistant biotypes are able to survive use rates several times higher than needed to control susceptible biotypes. Roadside managers are encouraged to adhere to the following weed control practices to prevent the occurrence of sulfonylurea urea resistant weeds. 1. Tank mix sulfonylurea urea herbicides with herbicides that have a different mode-of action (e.g. glyphosate, 2,4-D, etc.). 2. Do not let weed escapes go to seed in areas that were treated with sulfonylurea urea herbicide. 3. Respray problem areas with a herbicide that has a different mode-of-action than a sulfonylurea. 4. Rotate the use of sulfonylurea herbicides with herbicides that have a different mode-of-action.</p>				
<p><u>These dormant treatments are designed for roadsides having predominantly bermudagrass.</u></p>				
Annual Grass and Broadleaf Weed Suppression in <u>Dormant Bermudagrass</u>	sulfometuron (Oust) 75DG	1 oz.	0.75 oz.	Oust may be applied once in November to early-February <u>while the bermudagrass is dormant</u> for the control of winter annual grass and broadleaf weeds. This treatment may delay greenup of the bermudagrass.
	glyphosate (numerous brands)		0.38-0.5 lb.	Glyphosate may be applied in December to mid-March <u>while the bermudagrass is dormant</u> for the control of winter annual grass and broadleaf weeds. This treatment does not provide residual control.
	glyphosate + Oust 75 DG	-- + 0.25 oz.	0.25 lb. + 0.19 oz.	Apply in December to mid-March <u>while the bermudagrass is dormant</u> for the control of winter annual grass and broadleaf weeds. Bermudagrass greenup is not delayed extensively with this treatment.
	glyphosate + Oust 75DG + Telar 75DG	-- + 0.25 oz. + 0.25 oz.	0.25 lb. + 0.19 oz. + 0.19 oz.	Glyphosate + Oust + Telar may be applied in December through mid-March <u>while the bermudagrass is dormant</u> for the control of winter annual grasses and broadleaf weeds. Bermudagrass greenup is not extensively delayed by this treatment.
	imazapic + glyphosate (Journey) 0.75 + 1.5 lbs./gal.	16.0 fl. ozs.	0.094 + 0.25	Apply to dormant bermudagrass for the control of annual broadleaf weeds. Add a nonionic surfactant at 0.25% v/v to the spray mix. DO NOT apply immediately before or during spring green-up of bermudagrass or significant delays in green-up will occur.
	glyphosate + 2,4-D amine (Campaign) 3.1 lbs./gal.	1.0 to 2.0 qts.	0.3 + 0.48 to 0.6 + 0.95 lb.	Campaign may be applied once for the control of winter annual grass and broadleaf weeds before bermuda greenup. It may also suppress or control broadleaf weeds tolerant of these other treatments. Refer to the label for rates for particular species. It is not necessary to add a surfactant to Campaign. Since Campaign is a formulation containing 2,4-D, use special precautions when applying in the vicinity of 2,4-D sensitive crops such as vegetables, tobacco, fruit trees, ornamentals and cotton.
	diflufenzopyr + dicamba (Overdrive) 76.4% DF 0.2 lbs. + 0.5 lbs./lb.	4.0 ozs. to 8.0 ozs.	0.05+0.125 to 0.1+0.25	Controls annual and perennial broadleaf weeds. Add a nonionic surfactant at 0.25% v/v or methylated seed oil at 2.0 pts./acre to the spray mix. Diflufenzopyr has been shown to improve the activity of "auxin-like" herbicides such as triclopyr, clopyralid and picloram. May be tank-mixed with Garlon 4 and 3A, 2,4-D, Plateau, glyphosate, Escort, Oust, Telar and MSMA to increase spectrum of weed species controlled. Overdrive is rainfast within 4 hours after application.

GRASS ROADSIDE VEGETATION MANAGEMENT (continued)

SITE	HERBICIDE FORMULATION	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
		AMOUNT OF FORMULATION	ACTIVE INGREDIENT	
Maintenance of Actively Growing Bermudagrass (Weed Control or Suppression)	MSMA (Several trade names) 6 lbs./gal. or DSMA (Several trade names) 3.6 lbs./gal.	1/3 gal.	2.0 lbs.	May be applied during summer months every 4 to 6 weeks for suppression or control of emerged weeds. This treatment will release actively growing bermudagrass and suppress bahiagrass, dallisgrass, johnsongrass, and several broadleaf weeds.
	diflufenzopyr + dicamba (Overdrive) 76.4% DF 0.2 lbs. + 0.5 lbs./lb.	4.0 ozs. to 8.0 ozs.	0.05+0.125 to 0.1+0.25	Controls annual and perennial broadleaf weeds. Add a nonionic surfactant at 0.25% v/v or methylated seed oil at 2.0 pts./acre to the spray mix. Diflufenzopyr has been shown to improve the activity of "auxin-like" herbicides such as triclopyr, clopyralid and picloram. May be tank-mixed with Garlon 4 and 3A, 2,4-D, Plateau, glyphosate, Escort, Oust, Telar and MSMA to increase spectrum of weed species controlled. Overdrive is rainfast within 4 hours after application.
	glyphosate (numerous brands)	--	0.19 to 0.3125 lb.	May be applied during summer months to suppress or control emerged weeds and to release well-established and actively growing bermudagrass. For bahiagrass growth and seedhead suppression apply a second application at 0.125 lbs. ai/acre 6 to 8 weeks after the initial application.
	imazapic (Plateau) 2.0 lbs./gal.	3.0 to 4.0 fl. oz.	0.047 to 0.0625	Apply after full spring green-up of bermudagrass or during the summer months to suppress bahiagrass growth and seedhead development. Add a nonionic surfactant at 0.25% v/v or methylated seed oil at 1.5 to 2.0 pts./acre to the spray mix. Do not apply immediately before or during bermudagrass green-up. A second treatment may be applied 6 to 10 weeks for continued growth suppression.
	sulfometuron (Oust) 75DG	0.5 oz.	0.375 oz.	Oust may be applied after full spring green-up of bermudagrass to suppress bahiagrass growth and seedhead development and for the control of certain broadleaf weeds. A second treatment may be applied about 6 to 10 weeks later for continued suppression. Be certain that no bermudagrass injury is present before applying the second application. A nonionic surfactant at 0.25% v/v should be added to the spray mix.
	glyphosate + Oust 75DG	-- + 0.25 oz.	0.19 lb. + 0.19 oz.	Glyphosate + Oust may be applied to bermudagrass to provide bahiagrass seedhead inhibition and vegetative suppression. Apply one to two weeks after full greenup of bermudagrass and bahiagrass or after the bahiagrass has been mowed. Application should be made prior to seedhead emergence.
	imazapic + glyphosate (Journey) 0.75 + 1.5 lbs./gal.	8.0 to 16.0 fl. ozs.	0.047 + 0.125 to 0.094 + 0.25	Apply to actively growing bermudagrass for the control of annual broadleaf weeds, certain annual and perennial grasses and various sedges. Add a nonionic surfactant at 0.25% v/v to the spray mix.

GRASS ROADSIDE VEGETATION MANAGEMENT (continued)

SITE	HERBICIDE FORMULATION	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
		AMOUNT OF FORMULATION	ACTIVE INGREDIENT	
Maintenance of Actively Growing Bermudagrass (Weed Control or Suppression) (cont.)	aminopyralid (Milestone) 2 lbs./gal.	4.0 to 7.0 fl. ozs.	0.06 to 0.11	Controls numerous broadleaf weed species such as horseweed, dogfennel, horsenettle and tropical soda apple. Milestone is non-volatile, but use care when applying in the vicinity of broadleaf crops, fruit trees, and ornamentals. Milestone can be tank-mixed with Plateau, glyphosate, MSMA, 2,4-D and numerous other herbicides labeled for use on grass roadsides. Add a nonionic surfactant at 0.25% v/v to the spray mix.
	glyphosate + 2,4-D (Campaign) 3.1 lbs./gal.	1.0 to 1.5 qts.	0.3 + 0.48 to 0.45 + 0.72 lb.	Campaign may be applied to actively growing well established bermudagrass and bahiagrass to suppress or control emerged weeds and to allow the release of the bermudagrass. Use the low rate on bahiagrass. This treatment will control many broadleaf weeds tolerant of MSMA, DSMA, Roundup Pro, or Roundup Pro + Oust due to the 2,4-D which is one of the ingredients. Rate of application should be based on the weed species most common on the roadside (Refer to label). It is not necessary to add a surfactant to Campaign. Since Campaign is a formulation containing 2,4-D, use care when applying in the vicinity of 2,4-D sensitive crops such as vegetables, cotton, tobacco, fruit trees, and ornamentals.
Tall Fescue Seedhead Suppression and/or Weed Control	MSMA (Several trade names) or DSMA (Several trade names)	1/3 gal. 1 gal.	2.0 lbs. 3.6 lbs.	Mow roadsides, if needed, when bahiagrass or dallisgrass seedheads begin to appear (usually in early June). Begin treatment when grasses begin to send up new seedheads. Air temperature in afternoons should be 80 degrees or above. Apply as needed when new seedheads or other weeds emerge usually at 4 to 6 week intervals. Two or three applications during the summer will be needed. This treatment suppresses bahiagrass, dallisgrass, johnsongrass and broadleaf weeds and allows fescue to remain with little injury.
	glyphosate (numerous brands) + sulfometuron (Oust) 75DG	-- + 0.25 oz.	0.19-0.25 lb. 0.19 oz.	Glyphosate + Oust may be applied to tall fescue roadsides to suppress tall fescue seedhead production, broadleaf weeds and grasses. Apply to established, actively growing tall fescue in the spring <u>prior to seedhead emergence</u> (usually between March 1 and April 1). Slight discoloration of the fescue may occur.
	sethoxydim (Vantage) 1.0 lbs./gal.	1.5 pt.	0.19 lb.	Vantage may be applied to tall fescue roadsides to suppress tall fescue seedhead production. Apply to established tall fescue that is actively growing in the spring before the emergence of seedheads (usually between March 1 and April 1.) Do not apply to fescue less than one year old. Apply in 30 to 40 gallons of water per acre. Vantage will not suppress or control broadleaf plants which may be released due to the suppression of tall fescue. Discoloration of the fescue will often occur and may sometimes be severe.
	chlorsulfuron (Telar) 75DG	0.25 oz.	0.19 oz.	Telar may be applied to suppress tall fescue seedhead production. Apply to established tall fescue that is actively growing in the spring prior to seedhead emergence (usually between March 1 and April 1). Some suppression of the grass growth may occur. This treatment will also help to suppress or control many broadleaf weeds.
	glyphosate (numerous brands) + chlorsulfuron (Telar) 75DG	-- + 0.25 oz.	0.19-0.25 0.19 oz.	Glyphosate + Telar may be applied to tall fescue to suppress seedhead production and control some annual weeds. Apply to established tall fescue in the spring prior to seedhead emergence (usually between March 1 and April 1). Make only one application per season. Telar provides better control of thistles and mustards than Oust.

GRASS ROADSIDE VEGETATION MANAGEMENT (continued)

SITE	HERBICIDE FORMULATION	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
		AMOUNT OF FORMULATION	ACTIVE INGREDIENT	
Tall Fescue Seedhead Suppression and/or Weed Control (cont.)	glyphosate (numerous brands)	--	0.19-0.25	Glyphosate + metsulfuron may be applied to tall fescue to suppress seedhead production and control some annual weeds. Apply to established tall fescue in the spring prior to seedhead emergence (usually between March 1 and April 1).
	+ metsulfuron (Escort, Patriot) 60 DG	+	0.15 oz.	
	diflufenzopyr + dicamba (Overdrive) 76.4% DF 0.2 lbs. + 0.5 lbs./lb.	4.0 ozs. to 8.0 ozs.	0.05+0.125 to 0.1+0.25	Controls annual and perennial broadleaf weeds. Add a nonionic surfactant at 0.25% v/v or methylated seed oil at 2.0 pts./acre to the spray mix. Diflufenzopyr has been shown to improve the activity of "auxin-like" herbicides such as triclopyr, clopyralid and picloram. May be tank-mixed with Garlon 4 and 3A, 2,4-D, Plateau, glyphosate, Escort, Oust, Telar and MSMA to increase spectrum of weed species controlled. Overdrive is rainfast within 4 hours after application.
	aminopyralid (Milestone) 2 lbs./gal.	4.0 to 7.0 fl. ozs.	0.06 to 0.11	Controls numerous broadleaf weed species such as horseweed, dogfennel, horsenettle and tropical soda apple. Milestone is non-volatile, but use care when applying in the vicinity of broadleaf crops, fruit trees, and ornamentals. Milestone can be tank-mixed with Plateau, glyphosate, MSMA, 2,4-D and numerous other herbicides labeled for use on grass roadsides. Add a nonionic surfactant at 0.25% v/v to the spray mix.
	imazapic (Plateau) 2.0 lbs./gal.	2.0 to 3.0 fl. oz.	0.031 to 0.047	Apply in early spring to suppress tall fescue foliar growth and seedhead emergence.

WEED CONTROL IN NONCROPLAND

Tim R. Murphy, Extension Agronomist-Weed Science

APPLICATION METHOD	HERBICIDE FORMULATION	AMOUNT OF FORMULATION PER ACRE	REMARKS AND PRECAUTIONS
Herbicides used for soil applications on noncropland areas provide residual control of susceptible plants in treated areas and may result in bare ground for several months or years. Refer to the specific herbicide label for additional information.			
SOIL	prometon (Pramitol 25E) (Sonora 4SC) Prometon + Simazine + Sodium chlorate + Sodium metaborate (Pramitol 5PS)	4 to 10 gals. 2 to 5 gals. 152 to 400 lbs.	Controls numerous annual and perennial weeds. This product will inhibit plant growth for one or more years. Controls weeds through foliar and root contact; however, the primary activity is through root uptake. Apply before or shortly after weed emerge. Dry soil conditions and lack of rainfall may result in poor weed control. DO NOT use near adjacent desirable trees or shrubs. Pramitol 5PS is a ready-to-use pelleted product. Areas of application - industrial sites, railroad and highway rights-of-way, guard rails, around buildings, storage areas and fence rows.
SOIL	diuron (Karmex 80DF)	5 to 15 lbs.	Controls annual grass and herbaceous broadleaf weeds. Apply prior to or shortly after weeds emerge. For postemergence applications, add a nonionic surfactant at 0.25 to 0.5% v/v. DO NOT use on walks, driveways, tennis courts or similar areas. Areas of application - utility, railroad and roadside rights-of-way, lumberyards, industrial storage areas and around farm buildings.
SOIL	bromacil (40%) + diuron (40%) (Krovar I DF) (DiBro 2+2)	4 to 30 lbs. 200 to 400 lbs.	Controls annual and perennial weeds. Apply prior to or shortly after weeds emerge. Use the high rate for nutsedge and bermudagrass control. Krovar I plus surfactant may be tank mixed with 2,4-D amine, MSMA or paraquat. DO NOT use near desirable plants or in areas where their roots may extend. DO NOT use on walks, driveways, tennis courts or other similar areas. Areas of application - railroad and roadside rights-of-way, industrial storage areas and industrial sites.
SOIL	bromacil (Hyvar X) 80 WP (Hyvar X-L) 2 lbs./gal.	3 to 15 lbs. 1.5 to 12 gals.	Controls a wide range of annual and perennial weeds, brush and trees. Use the high rates for brush and tree control. Refer to label for the use of lower rates for annual and perennial weed control. DO NOT apply over the root zone of desirable plants, or in locations where bromacil may be washed or moved into contact with their roots. DO NOT use on lawns, walkways, tennis courts or other similar areas. Areas of application - railroad and roadside rights-of-way, lumberyards, storage areas and industrial plant sites.
SOIL	imazapyr (0.5%) + diuron (2.0%) (TopSite) 2.5G	200-300 lbs.	Controls a wide range of annual and perennial grass and broadleaf weeds. Apply as a preemergence or very early postemergence application. DO NOT use on lawns, walks, driveways, tennis courts or other similar areas. DO NOT apply over the rootzone of desirable plants. Areas of application - railroad, utility, pipeline and highway rights-of-way, petroleum tank farms, storage areas, and other similar areas.
SOIL	imazapyr (Arsenal) 0.5G (Truce) 0.5G	200 lbs.	Controls a wide range of grass and broadleaf weeds. Apply before weeds emerge. DO NOT use on lawns, walks, driveways, tennis courts or other similar areas. DO NOT apply over the rootzone of desirable plants. Areas of application - railroad, utility, pipeline and highway rights-of-way, petroleum tank farms, fence rows, storage areas, and other similar areas.
SOIL	hexazhone (Velpar 75DF) (Velpar L) 2 lbs./gal. (Pronone MG) (Pronone 10G)	3 to 10 lbs. 1 to 6 gals. 30 to 120 lbs. 30 to 120 lbs.	Controls a wide range of annual and perennial weeds and various brush and tree species. Apply just before or soon after weed emergence. For tree and brush control apply from the late winter to early summer. Velpar L can be soil applied with an exact delivery handgun or applied as a lace and streak treatment for woody plant control. Pronone MG and 10G are ready-to-use granular formulations that are spread over the area to be treated. DO NOT use over the root zone of desirable trees. DO NOT use on lawns, walks driveways, tennis courts or similar areas. Areas of application - railroad, utility and roadside rights-of-way, industrial storage areas and other similar sites.

WEED CONTROL IN NONCROPLAND (continued)

APPLICATION METHOD	HERBICIDE FORMULATION	AMOUNT OF FORMULATION PER ACRE	REMARKS AND PRECAUTIONS
SOIL (cont.)	tebuthiuron (Spike 80W) (Spike 20P) (Sprakil S-5)	1.5 to 7.5 lbs. 3.75 to 30 lbs. 40.0 to 120.0 lbs.	Controls a wide range of woody vines, brush and trees. Apply year round, except when soil is saturated with water or frozen. Wettable powder formulations is mixed with water and applied to the site. Pellet and granule formulations are applied directly to the soil as a broadcast or spot application. DO NOT apply in any area where the roots of desirable plants are located. Spike 80W can be tank-mixed with Surflan 4AS for improved annual grass control. Tebuthiuron is not labeled for use on walks, driveways, streets, tennis courts, or under swimming pools, asphalt or concrete. Areas of application - utility, railroad and roadside rights-of-way, fence rows and industrial storage areas.
SOIL	dicamba (Veteran) 10G	20.0 lbs.	Controls a wide range of herbaceous and "brushy" broadleaf plants. Apply in spring just before or during active growth. DO NOT apply over the root zone of desirable plants. Areas of application - fence rows, roadsides, noncropland areas.
SOIL	dichlobenil (Casoron 4G)	250 to 300 lbs.	Control wide range of annual grass and broadleaf weeds. Woody vines, brush and trees are usually tolerant to dichlobenil. Apply granules during the cool months (December to mid-February) of the year. If applications are made at temperatures greater than 70°F., dichlobenil should be incorporated into the soil by irrigation water (1/4 inch) or shallow tillage. DO NOT apply to slopes located above crops or lawns as run-off from treated areas could cause injury. Areas of application - utility, roadside and railroad rights-of-way, industrial and recreational areas, and fence rows.
SOIL	tebuthiuron + diuron (Sprakil 13) 1.0 + 3.0G (Sprakil 26) 2.0 + 6.0G	150 to 400 lbs. 150 to 400 lbs.	Controls a wide range of annual and perennial grass and broadleaf weeds. May be applied year-round; however, for best results apply in spring to early summer for best results. DO NOT apply near desirable trees in areas where roots may extend into the treated area. DO NOT use on cropland or on land to be used for subsequent cropping. DO NOT contaminate irrigation ditches or water used for domestic purposes.
FOLIAGE	chorsulfuron (Telar 75DG)	0.25 to 3.0 oz.	Primarily effective for the control of annual and perennial broadleaf weeds. A surfactant at 0.25% v/v should be included in the spray mix for postemergence applications. DO NOT allow spray to drift to desirable plants. Sprayers that have contained chorsulfuron should be used on noncropland areas. Areas of application - utility, roadside and railroad rights-of-way, fence rows and industrial storage areas.
FOLIAGE	metsulfuron (Escort 60DF) (Patriot 60DF)	0.3 to 4.0 oz.	Effective for control of annual and perennial weeds, kudzu, certain woody species, and Pensacola bahiagrass. A surfactant at 0.25% v/v should be included in the spray mix. DO NOT allow sprays to drift to desirable plants. Sprayers that have contained metsulfuron should be used only on noncropland areas. Areas of application - utility, roadside, and railroad rights-of-way, fence rows and industrial storage areas.
FOLIAGE	sulfometuron (Oust 75DG) (Spyder 75DG)	2 to 8 oz.	Controls a wide range of annual and perennial broadleaf weeds, certain annual grasses and woody vines. Apply as preemergence or postemergence treatment. A surfactant at 0.25% v/v should be included in the spray mix for postemergence applications. DO NOT allow sprays to drift to desirable plants or apply to soils saturated with water. Sprayers that have contained sulfometuron should be used only on noncropland areas. Areas of applications - utility, roadside and railroad rights-of-way, fence rows and industrial storage areas.
FOLIAGE	diuron (62%) + imazapyr (8%) (Sahara DG)	13 to 19 lbs.	Provides postemergence and preemergence control on numerous grass, broadleaf weed, brush and vine species. Postemergence applications are recommended for perennial plants. Use where bare ground (no plant growth) is desired. Add a nonionic surfactant at 0.25% v/v, or methylated seed oil at 1.5 to 2.0 pts./A.. DO NOT use on lawns, walks, driveways, tennis courts or other similar areas. DO NOT apply over the rootzone of desirable plants. Areas of application - railroad, utility, pipeline and highway rights-of-way (including pavement edges, guard rails, sign posts and delineators), petroleum tank farms, fence rows, storage areas, non-irrigation ditch banks and other similar areas.
FOLIAGE	2,4-D (Numerous trade names and formulations)	1 to 4 lbs. ai/A	Controls certain annual and perennial broadleaf weeds. Apply to actively-growing weeds. Ester formulations volatilize at temperatures > than 70°F and can injure sensitive plants. Amine formulations are recommended during the warm months. DO NOT allow sprays to drift to desirable plant. Areas of application - utility, railroad and roadside rights-of-way, fence rows and industrial storage areas.

WEED CONTROL IN NONCROPLAND (continued)

APPLICATION METHOD	HERBICIDE FORMULATION	AMOUNT OF FORMULATION PER ACRE	REMARKS AND PRECAUTIONS
FOLIAGE (cont.)	2,4-D + 2,4-DP (Weedone 170) 1.85 + 1.85 lbs./gal. (Weedone CB) 0.67 + 0.67 lbs./gal. (Patron 170) 1.83 + 1.87 lbs./gal.	1.0 to 1.5 gals. Undiluted 1.0 to 1.5 gals.	Controls a broader range of vines, brush and trees than 2,4-D. Apply during the spring and summer months. Weedone 170 and Patron 170 may also be applied as a basal bark, cut stump or frill treatment. Weedone CB is a ready to use product that requires no mixing. Weedone CB is also labeled as basal bark and cut stump treatment. These herbicides are ester formulations. Use with caution during the warm months of the year. DO NOT allow sprays to drift to desirable plants. Areas of application - utility, railroad and roadside rights-of-way, fence rows and industrial storage areas.
FOLIAGE	2,4-D + dicamba (Weedmaster) 2.87 + 1.0 lb./gal. (Veteran 720) 1.9 + 1.0 lb./gal.	0.5 to 4.0 pts. 1.0 to 8.0 qts.	Controls most broadleaf weeds and certain vine, brush and trees. Apply to foliage of actively growing plants. DO NOT apply over the root zone of desirable trees or allow sprays to drift to desirable plants. Areas of application - utility, roadside, and railroad rights-of-way, fence rows, industrial storage areas, and other similar noncropland areas.
FOLIAGE	MCPA + dicamba (Veteran 2010) 2.5 + 1.25 lbs./gal.	2.0 to 8.0 qts.	Controls various herbaceous broadleaf weeds, and woody brush and trees. Use the low rate on herbaceous plants; the high rate on woody plants. DO NOT allow sprays to drift to desirable plants. Areas of application - rights-of-way, fence rows, roadsides and other similar areas.
FOLIAGE	2,4-D + triclopyr (Crossbow) 2.0 + 1.0 lb./gal.	0.5 to 4.0 gals.	Controls a wide range of broadleaf weeds, vines and woody plants. Apply to the foliage of actively growing plants. May also be applied as a dormant stem, basal bark and cut stump treatment. Use the low rate for broadleaf weeds. Refer to label for rates for woody species. DO NOT allow sprays to drift to desirable plants. Crossbow is a low volatile ester formulation. Use with caution during the summer months. Areas of application - roadside rights-of-way, fence rows and industrial storage areas.
FOLIAGE	dicamba (Vanquish) 4.0 lbs./gal.	0.25 to 2.0 gals.	Controls a wide range of broadleaf weeds, vines and woody plants. Apply to the foliage of actively growing plants. Vanquish may also be used as cut stump treatment (1 part Vanquish to 1 to 3 parts water). DO NOT apply over the root zone of desirable trees or allow sprays to drift to desirable plants. Areas of application - utility, roadside and railroad rights-of-way, fence rows and industrial storage areas.
FOLIAGE	diquat (Reward) 2.0 lbs./gal.	1 to 2 qts.	Controls most annual grasses and annual broadleaf weeds. Control of perennial weeds is poor. Apply to the foliage of actively growing weeds. A nonionic surfactant at 0.125% v/v should be included in the spray mix. DO NOT allow sprays to drift to desirable plants. DO NOT apply over the root zone of desirable trees or allow sprays to drift to desirable plants. Areas of application - utility, roadside and railroad rights-of-way, fence rows and industrial storage areas.
FOLIAGE	paraquat (Gramoxone Max) 3.0 lbs./gal.	1.7 to 2.7 pts.	Controls most annual grasses and annual broadleaf weeds. Control of perennial weeds is poor. Apply to the foliage of actively growing weeds. A nonionic surfactant at 0.125% v/v should be included in the spray mix. DO NOT enter treated areas for 24 hours after application unless protective clothing and equipment is worn. Areas of application - utility, railroad and roadside rights-of-way, commercial buildings, industrial storage areas, walkways, patios, along driveways and fences.
FOLIAGE	glyphosate (numerous brands and formulations)	1.0 to 5.0 lbs. ai/acre	Controls a wide range of grass and broadleaf weeds, vines, brush and trees. Apply to the foliage of actively growing plants. A nonionic surfactant at 0.5% v/v should be included in Accord spray mixes. DO NOT allow sprays to drift to desirable plants. Areas of application: roadside and railroad rights-of-way, fence rows, irrigation ditchbanks and industrial storage areas.
FOLIAGE	MSMA DSMA (Several trade names and formulations)	2 lbs. ai/A. 3.6 lbs. ai/A	Controls most annual grasses, johnsongrass, dallisgrass, bahiagrass, nutsedge and certain broadleaf weeds. Apply to actively-growing weeds. DO NOT allow sprays to drift to desirable plants. Areas of application - utility, roadside and railroad rights-of-way, fence rows, industrial sites and drainage ditchbanks.

WEED CONTROL IN NONCROPLAND (continued)

APPLICATION METHOD	HERBICIDE FORMULATION	AMOUNT OF FORMULATION PER ACRE	REMARKS AND PRECAUTIONS
FOLIAGE (cont.)	clopyralid (Transline) 3.0 lbs./gal. (Stinger) 3.0 lbs./gal.	0.25 to 1.33 pts. 0.25 to 1.33 pts.	Controls a wide range of annual and perennial broadleaf weeds. Grasses and members of the mustard family are tolerant to clopyralid. DO NOT allow sprays to drift to desirable plants. Areas of application - Transline: utility, roadside and railroad rights-of-way, and industrial storage areas. Stinger: fence rows, around farm buildings and equipment pathways.
FOLIAGE	fosamine (Krenite S) 4.0 lbs./gal.	1.5 to 3.0 gal.	Used for the control and growth suppression of a wide range of woody plants. Apply from July until fall leaf coloration. Fosamine affects only the portion of the foliage contacted by the spray and can be used for trimming or partial growth suppression. DO NOT allow sprays to drift. Areas of application: utility, roadside and railroad rights-of-ways, areas adjacent to domestic water supplies, lakes and ponds, industrial storage areas and drainage ditchbanks.
FOLIAGE	imazapyr (Arsenal) 2.0 lbs./gal. (Chopper) 2.0 lbs./gal.	2 to 6 pts. See label.	Arsenal formulations control a wide range of grass and broadleaf weeds, vines, brush and trees. Arsenal may be applied as a preemergence or postemergence treatment. For Arsenal liquid, postemergence applications are preferred for perennial weeds. Chopper is used as a cut stump, frill or low volume basal bark treatment. DO NOT allow sprays to drift or apply over the root zone of desirable plants. DO NOT use on lawns, walks, driveways, tennis courts, or similar areas, or any area where landscape plantings are anticipated. Areas of application - utility and railroad rights-of-way, fence rows and industrial storage areas. Arsenal liquid may also be used under asphalt and concrete pavement.
FOLIAGE	picloram (Tordon K) 2.0 lbs./gal.	0.25 to 4.0 qts.	Controls a wide range of broadleaf weeds and woody plants. Most grasses are tolerant to picloram. Apply to the foliage of actively growing plants. Most crop plants and ornamentals can be severely injured by picloram. DO NOT allow sprays to drift or apply over the root zone of desirable plants. Tordon K is a Restricted Use Herbicide. Areas of application - utility, roadside and railroad rights-of-way, and industrial storage areas.
FOLIAGE	picloram + 2,4-D (Pathway) (Tordon 101M) 0.54 + 2.0 lbs./gal.	Undiluted 0.5 to 4.0 gals.	Pathway and Tordon 101R are ready-to-use products labeled for the control of woody plants. These herbicides are used as a cut stump, tree injection or frill treatment. Tordon 101M controls broadleaf weeds, vines, brush, and trees. Tordon 101M may be used as a foliage, tree injection, frill or cut stump treatment. Most crop plants are sensitive to picloram. DO NOT allow sprays to drift or apply over the root zone of desirable plants. Tordon 101M is a Restricted Use Herbicide. Areas of application - Pathway: utility, roadside and railroad rights-of-way and fence rows. Tordon 101M: utility, roadside and railroad rights-of-way and industrial storage areas.
FOLIAGE	picloram + triclopyr (Access) 1.0 + 2.0 lbs./gal.	See label.	Controls woody plants. Applied as a basal bark and thinline basal bark treatment. Access is mixed either with oil (diesel fuel, kerosene, No. 1 or 2 fuel oil, or Arborchem Basal Oil) or oil-water solutions. Refer to label for mixing instructions. Most crop plants and ornamentals can be severely injured by Access. DO NOT allow sprays to drift or apply over the root zone of desirable plants. Access is a Restricted Use Herbicide. Areas of application - utility, roadside and railroad right-of-way, fence rows and industrial storage areas.
FOLIAGE	triclopyr (Garlon 3A) (Tahoe 3A) 3.0 lbs./gal. (Garlon 4) (Tahoe 4E) 4.0 lbs./gal. (Pathfinder)	0.5 to 1.0 gal. 1.0 to 3.0 qts. Undiluted	Controls a wide range of broadleaf weeds, vines brush and trees. Most grasses are tolerant to triclopyr. Triclopyr formulations are used as a foliage treatment, basal bark (Garlon 4, Tahoe 4E), cut surface, (Garlon 3, Tahoe 3A) and cut stump treatment. Pathfinder is a ready-to-use product labeled for basal bark and cut stump treatments. DO NOT allow sprays to drift to desirable plants. Areas of application: utility, roadside and railroad rights-of-way, fence rows, industrial storage areas and around farm buildings.
DORMANT STEM TREATMENTS	2,4-D + 2,4-DP (Weedone 170) 3.7 lbs./gal.	3 to 4 gal. + 100 gal. diesel oil	Spray in winter when plants are dormant and drench all branches and stems.
DORMANT STEM TREATMENTS	2,4-D + 2,4-D (Weedone CB ready to use) 1.33 lbs./gal.	Undiluted	Apply undiluted to brush (up to 4 inches trunk diameter at breast height) to the lower 18-36 inches of the plant stem. Treat all around the stem including the root collar area and any exposed roots.

WEED CONTROL IN NONCROPLAND (continued)

APPLICATION METHOD	HERBICIDE FORMULATION	AMOUNT OF FORMULATION PER ACRE	REMARKS AND PRECAUTIONS
DORMANT STEM TREATMENTS (cont.)	2,4-D + triclopyr (Crossbow) 3 lbs./gal.	1.5 to 4 gal. + 96 to 99 gal. of diesel fuel, or No. 2 fuel oil.	Apply to brush to thoroughly wet upper and lower stems including the root collar and any ground sprouts. Apply when bark is dry and brush is dormant. Best results are obtained with late winter to early spring applications.
DORMANT STEM TREATMENTS	triclopyr (Garlon 4) (Tahoe 4E) 4 lbs./gal.	4 to 8 qts. in 100 gal. of spray mix	Controls most woody plants with stems less than 2 inches in diameter. Crop oil concentrate at 3.0% v/v should be added to the spray mix. Alternatively, mix 3 to 6 quarts of triclopyr in enough diesel fuel to make 100 gallons of spray mix. Apply mixture by spraying at 20-40 psi any time when brush is dormant, foliage has dropped and from within 10 weeks before and up to bud break. Thoroughly wet the entire plant to the point of runoff. Also spray the ground under the plants for control of root-suckering species such as sumac, persimmon, sassafras and locust. Apply up to 150 gallons of spray mixture per acre.
BASAL TREATMENT	picloram + triclopyr (Access) 1.0 lbs./gal. + 2.0 lb./gal.	1 to 2 gals. + 98 to 99 gals. of diesel oil, or No. 1 or No. 2 fuel oil	Add the herbicide to the oil and mix thoroughly. Use the higher rate of herbicide for hard to control species or trees with diameters 4 inches to 6 inches. Apply using low pressure (20-40 psi) to the basal parts of brush and tree trunks to a height of 12-15 inches from the ground. Spray until run-off at the ground line. Also, spray the ground under the plants for control of root suckering species. Best control will be obtained when applications are made during the late dormant or active growing season.
BASAL TREATMENT	triclopyr (Garlon 4) (Tahoe 4E) 4 lbs./gal.	1 to 5 gallons in 99 to 95 gal. of diesel fuel, or No. 2 fuel oil	Controls most woody plants with stems less than 6 inches in diameter. Apply any time except when snow or water prevents spraying to the ground line. Spray the basal part of the tree and brush to a height of 12 to 15 inches above the ground. Spray completely around the tree or brush stem until runoff at the ground line is visible. Triclopyr may also be applied as a low volume basal bark, streamline basal bark and thinline basal bark treatment. Refer to the label for information on these application techniques.
CUT STUMP	2,4-D + 2,4-DP (Weedone 170) 3.7 lbs./gal.	3 to 4 gal. in 100 gal. of oil	Apply with low volume knapsack sprayer using solid cone nozzle of medium orifice. Spray the entire freshly cut stump particularly bark and exposed roots. A thorough drenching is essential for complete control. Spray is effective and economical on stumps 3 to 4 inches and larger.
CUT STUMP	2,4-DP + 2,4-D (Weedone 170) (Patron 170)	Undiluted	Apply undiluted to fresh cut stumps up to 3 inches in diameter. Cut the stems as close to the ground as possible before treating.
CUT STUMP	Picloram + 2,4-D (Tordon 101M)		Spray or paint within one hour of cutting, the cut surfaces of freshly cut stumps or stubs with either herbicide. The cambium area adjacent to the bark should be thoroughly wet. Tordon 101M may be applied undiluted or diluted 1:1 with water.
CUT STUMP	Picloram + 2,4-D (Pathway)	Undiluted	Spray or paint within one hour of cutting, the cut surfaces of freshly cut stumps and shrubs with undiluted herbicide. The cambium area adjacent to the bark should be thoroughly wet.
CUT STUMP	dicamba (Banvel CST) (Veteran CST) 1 lbs./gal.	Undiluted	Spray or paint within one hour of cutting, freshly cut stump surfaces. The area adjacent to the bark should be thoroughly wet.
CUT STUMP	dicamba (Vanquish) 4.0 lbs./gal.	Diluted	Mix 1 part of dicamba with 1 to 3 parts water and spray or paint freshly cut stump surface. The area adjacent to the bark should be thoroughly wet.

WEED CONTROL IN NONCROPLAND (continued)

APPLICATION METHOD	HERBICIDE FORMULATION	AMOUNT OF FORMULATION PER ACRE	REMARKS AND PRECAUTIONS
CUT STUMP (cont.)	triclopyr (Garlon 3A) (Tahoe 3A) 3.0 lbs./gal.	Undiluted	Spray or paint the cut surfaces of freshly cut stumps and stubs with undiluted triclopyr 3A. The cambium area next to the bark is the most vital area to wet.
	(Garlon 4) (Tahoe 4E) 4.0 lbs./gal.	2 to 3 gals. + 8 to 7 gals. of diesel oil	Apply mixture with a backpack sprayer. Spray the root collar area, sides of the stump, and the cambium area. Apply within one hour of cutting at any time of the year, except when snow or water prevents spraying to the ground line. Use only triclopyr 4 or 4E (ester).
CUT STUMP	triclopyr (Pathfinder)	Undiluted	Apply to the sides of the stump and the cambium area. Apply at any time of the year, except when snow or water prevents spraying the ground line.
KUDZU	dicamba (Vanquish) 4.0 lbs./gal.	1 to 2 gal.	Apply in 50 gallons of water per acre to kudzu after full leaf development. Repeat treatment one year later if kudzu appears. Refer to drift comments in foliage section.
KUDZU	picloram + 2,4-D (Tordon 101M)	2 to 3 gal.	Apply in 40 to 50 gallons of water per acre for complete coverage. Apply after the foliage is well developed. Repeat treatment one year later if kudzu appears. Refer to drift comments in foliage section.
KUDZU	tebuthiuron (Spike 20P)	20 lbs.	Spike may be used as a soil treatment for control of kudzu. Apply in the spring. Repeat treatments may be needed. DO NOT use where marketable timber or desirable trees or shrubs are adjacent to the area. Rates exceeding 20 lbs./A may cause severe injury to perennial grasses. Apply before bermudagrass or other summer perennial grasses break dormancy.
KUDZU	triclopyr (Garlon 4) (Tahoe 4E) 4.0 lbs./gal.	1 to 2 qts.	Apply to kudzu after full leaf development in the summer months. Repeat treatments may be needed. Many plants are susceptible to injury from this herbicide. DO NOT spray when wind speed is greater than 5 mph or otherwise favors drift to plants such as cotton, vegetables, ornamentals, etc.
KUDZU	clopyralid (Transline) 3.0 lbs./gal.	21 oz.	Apply to kudzu after full leaf development in the summer months. Repeat treatments may be needed. Many broadleaf plants are susceptible to Transline. Avoid applications during windy conditions when spray drift to desirable plants may occur.
KUDZU	glyphosate (Roundup Pro) 4.0 lbs./gal.	4.0 qts.	Apply to kudzu at the full bloom growth stage or up to one month after bloom. Repeat applications will be needed to control regrowth.
KUDZU	metsulfuron (Escort 60DF) (Patriot 60 DF)	3 to 4 ozs./A.	Apply to kudzu after full leaf development in the summer months. Add a surfactant at 0.25 to 0.5% v/v. Repeat treatments may be needed. DO NOT use over the root zone of desirable plants or allow sprays to drift.
ASPHALT SURFACES (Herbicides applied before laying asphalt)	dichlobenil (Casoron 4G)	250 to 300 lbs.	Apply after the final grade is achieved to control weeds under asphalt in roadway, parking lots and residential areas. Treated areas should be covered with asphalt as soon as possible. For resurfacing work, existing weeds should be sprayed with a contact herbicide prior to the dichlobenil application.
ASPHALT SURFACES	trifluralin (Treflan 5G)	240 to 300 lbs.	Treflan 5G may be applied after the final grade is established or after base rock has been added. Asphalt paving should follow Treflan application as soon as possible. DO NOT apply Treflan to areas where asphalt is laid directly on top of soil. May be used in residential and recreation areas.
ASPHALT SURFACES	prometon (Pramitol 25E) (Sonora 4SC)	7.5 to 10 gals. 2 to 5 gals.	Apply to soil just before laying asphalt in parking lots, highway shoulders and median strips, roadways and other industrial sites. Apply in a minimum of 100 gallons of water per acre. DO NOT use on land near adjacent trees or other desirable plants.

WEED CONTROL IN NONCROPLAND (continued)

APPLICATION METHOD	HERBICIDE FORMULATION	AMOUNT OF FORMULATION PER ACRE	REMARKS AND PRECAUTIONS
ASPHALT SURFACES (Herbicides applied before laying asphalt) (cont.)	bromacil (Hyvar X) (Hyvar X-L)	10 to 30 lbs. 4 to 12 gals.	Use bromacil under asphalt only in industrial sites or where the pavement has a suitable barrier along the perimeter that prevents encroachment of roots of desirable plants. Apply to subgrade and after final grading. Apply in a minimum of 100 gallons of water per acre. If soil is not moist, incorporate bromacil 4 to 6 inches deep with a disk or rototiller. Rainfall or irrigation of 2 inches will also provide uniform incorporation. DO NOT use in residential areas such as driveways, parking lots, walkways, tennis courts, golf cart paths, or any area where landscape planting could be anticipated.
ASPHALT SURFACES	diuron (62%) + imazapyr (8%) (Sahara DG)	13 to 19 lbs.	Apply to the soil surface after the final grade is established prior to laying asphalt in noncropland areas. If moisture is not present, Sahara should be disked or rototilled into the soil to a depth of 4 to 6 inches. DO NOT move soil after application or apply where Sahara may contact the roots of desirable plants. Sahara is NOT recommended for used under pavement in residential properties such as driveways, parking lots, or in recreational areas such as golf cart paths, or tennis courts.
ASPHALT SURFACES	imazapyr (Arsenal) 2.0 lbs./gal.	6 pts.	Apply to the soil surface after the final grade is established prior to laying asphalt in noncropland areas. If moisture is not present, Arsenal should be disked or rototilled into the soil to a depth of 4 to 6 inches. DO NOT move soil after application or apply where Arsenal may contact the roots of desirable plants. Arsenal is NOT recommended for used under pavement in residential properties such as driveways, parking lots, or in recreational areas such as golf cart paths, or tennis courts.
ASPHALT SURFACES	sodium metaborate (48%) + sodium chlorate (30%) (Bare-Spot Monobor Chlorate)	870 to 1,740 lbs.	Apply to the soil surface after the final grade has been established prior to laying asphalt. DO NOT apply over the root zone of desirable trees and shrubs.
ASPHALT SURFACES (emerged weeds)	2,4-D (Numerous trade names) 2.0 lbs./gal.	1 to 2 qts.	Controls broadleaf weeds. DO NOT allow sprays to drift to desirable plants. May be tank mixed with MSMA.
ASPHALT SURFACES	MSMA 6.0 lbs./gal.	0.5 gal.	Controls annual grasses, certain perennial grasses and some annual weeds. May be tank mixed with 2,4-D. DO NOT allow sprays to drift to desirable plants.
ASPHALT SURFACES	glyphosate (numerous brands and formulations)	1.0 to 5.0 lbs. ai/acre	Controls a wide range of grass and broadleaf weeds. DO NOT allow sprays to drift to desirable plants.

NONCROPLAND WOODY PLANT RESPONSE TO HERBICIDES

Tim R. Murphy, Extension Weed Scientist

	Hyvar	Spike	Velpar	Triclopyr 4	Triclopyr 3A	Pathfinder	Roundup/ Accord	Banvel/ Vanquish
Woody Plant	Soil Applications			Basal	Cut Stump Application			
Ash	F	F	F	F	P	F	F	F
Bamboo	P	P	F	P	P	P	P	P
Birch	F	F	F	F		P	F	F
Blackberry	F	F	F	G	F	G	G	G
Cedar, Red	F	P	F	F	F	P	P	P
Cherry , Wild				G	G	G		G
Chinaberry		G		G	G			
Dogwood	F	G	F	G	F	F	F	F
Elm	F	G	F	F	F	F	F	F
Greenbrier (Smilax)	P	F	P	P	P	P	P	P
Hawthorn	F	P	P	F	F	P	F	F
Hickory	F	F	P	G	P	P	F	F
Honeysuckle	P	G	P	P	F	G	P	P
Kudzu	P	P	P	P	F	G	F	F
Locust, Black	F	G	G	F	P	P	F	F
Locust, Honey	F	G	G	F	P	P	F	F
Maple spp.	F	F	F	G	P	F	F	F
Mulberry	F	F	F	F		P	F	F
Oak spp.	F	G	G	G	F	F	G	G
Orange, Osage	F	P	F	P	P	P	P	P
Persimmon	P	P	P	F	G	P	F	F
Pine spp.	F	F	P	G	G	P	G	G
Poison ivy/oak	F	P	F	P	F	P	G	G
Poplar	F	F	F	F		P	F	F
Privet, Chinese		E	G	E	E	E		F
Rose, multiflora	F	G	G	F	F	F	F	F
Sassafras	P	P	P	F	F	P	F	F
Sumac	F	G	F	G	F	P	G	G
Sweetgum	F	F	F	G	F	P	G	G
Sycamore	F	F	F	F		P	F	F
Trumpet creeper	P	F	P	P	F	P	P	P
Willow	F	F	F	G	F	P	F	F

Key to Response Symbols: E = Excellent Control; G = Good Control; F= Fair Control; P = Poor Control
If no symbol is given, weed response is unknown.

NONCROPLAND WOODY PLANT RESPONSE TO HERBICIDES (cont.)

	Hyvar	Krenite	Roundup /Accord	Transline	2,4-D	Arsenal	Banvel/ Vanquish	Escort	Triclopyr 4	Triclopyr 3A
Woody Plant	Foliage Applications									
Ash	F	F	F	P	P	G	P	F	F	F
Bamboo	P		P-F	P	P	G	P	P	P	P
Birch	F	F	F	P	F	P		P	F	F
Blackberry	F	F	F	P	P	P	F	G	E	E
Cedar, Red	F	P	P	P	P	P	F	P	P	P
Cherry, Wild		F	F	P	P		P	G	G	G
Chinaberry				P	P		F		G	G
Dogwood	F	F	P	P	P	G	F	F	F	F
Elm	F	F	F	P	F	P	F	F	F	F
Greenbrier (Smilax)	P	P	P	P	P	G	P	P	P	P
Hawthorn	F	P	F	P	F	G	F	P	F	F
Hickory	F	P	G	P	F	G	P	P	G	G
Honeysuckle	F	F	F	P	P	G	F	G	P	P
Kudzu	P	F	F	G	P	P-F	F	G	G	G
Locust, Black	F	G	G	G	P	P	P	G	G	G
Locust, Honey	F	F	P	G	P	P	P	P-F	F	F
Maple spp.	F	F	P	P	P	G	P	F	F	F
Mulberry	F	F	P	P	P	G		P	F	F
Oak spp.	F	F	G	P	F	G	F	F	G	G
Orange, Osage	F	F	P	P	P	P	P	P	P	P
Persimmon	P	F	F	P	P	F	G	P	F	F
Pine spp.	F	G	P	P	P	P	G	P	G	G
Poison ivy/oak	F	P	F	P	P	G	F	P	E	E
Poplar	F	F	F	P	F	F		P	F	F
Privet, Chinese			G	P	P	G	P	P	P	P
Rose, multiflora	F	F	F	P	P	G	F	E	F	F
Sassafras	P	P	P	P	P	G	F	P	G	G
Sparkleberry						G				
Sumac	F	F	F	P	F	G	F	P	G	G
Sweetgum	F	F	G	P	P	G	F	P	G	G
Sycamore	F	F	P	P	F	F		P	F	F
Trumpetcreeper	P	F	F	P	P	G	F	P	P	P
Willow	F	F	F	P	P	G	F	P	F	F

Key to Response Symbols: E = Excellent Control; G = Good Control; F= Fair Control; P = Poor Control
 If no symbol is given, weed response is unknown.