

WEED CONTROL
Bert McCarty
Turf and Weed Control Specialist

The best defense against weeds is a dense, vigorously growing turf. By adapting the right grass to the site and following correct cultural management, including proper fertilization, mowing, and irrigation, weeds will not be able to compete as well as with the turf. Before deciding to use any herbicide, diagnose first why the turf is thin and weeds are invading. Correct the basic problem of unhealthy turf before using any herbicide. **HERBICIDES ARE NOT A SUBSTITUTE FOR SOUND CULTURAL PRACTICES.**

Deciding Which Herbicide to Use

The first step toward a successful weed management program is the accurate identification of the desirable and undesirable plants involved. There are about 100 weeds that commonly occur in turfgrass. These plants can be grouped as weedy grasses, grass-like weeds, sedges and broadleaf weeds. Refer to *Color Atlas of Turfgrass Weeds*, *Weeds of Southern Turfgrasses* listed on page 2 of this publication or to Turfgrass Slide Monograph, *Common Turfgrass Weeds*, available from the Crop Science Society of America, as pictorial identification guides.

Next, determine if you wish to control weeds before planting (called Pre-plant). This involves either fumigating which controls most pests such as weeds, diseases, insects, and nematodes or do you just want to nonselectively control the existing weeds. If so, nonselective herbicides do not control weed seeds, insects, diseases, nematodes, etc., like fumigation does.

Next, do you wish to control weeds before they emerge (before you see them). If so, then a preemergence (often abbreviated PRE) herbicide should be considered. This involves applying the herbicide before the weed seeds germinate. Refer to the tables on weed control efficacy by the various PRE herbicides and the one on turfgrass tolerance to decide which materials may be used for your situation. Additional information is available in the larger tables on the specific products, trade names, application rates, weeds controlled, and important comments. A separate table is provided which lists currently registered products for bentgrass and/or bermudagrass golf greens.

Weeds which have already emerged are controlled selectively in turf with postemergence (often abbreviated POST) herbicides. The tables under Postemergence Herbicides should be consulted to determine weed susceptibility to various herbicides and more important, turf tolerance to these herbicides. Separate tables are provided on grass weed susceptibility and broadleaf weed susceptibility to the various POST herbicides. Again, additional information is available in the larger tables on the specific products, trade names, application rates, weeds controlled, and important comment sections.

If you know that sedges are your problem, refer to the nutsedge control section. This lists products available, turf tolerance, weed susceptibility and additional information on each product.

Finally, the last table of the Weed Control section lists the most often used products by common names along with their corresponding trade names, manufacturers and/or distributors.

PRE-PLANT NONSELECTIVE WEED CONTROL (*Refer to Herbicide Label for Specific Use Listing*)

Common Name	Trade Name(s)	Soil Fumigant	Soil Residual/ root uptake	Foliar Uptake	Contact Activity
Ammoniated soaps of fatty acids	Quick Fire	—	—	—	Y
Bromacil	Acti-Cil, Hyvar, Opti-Kill,	—	Y	Y	—
Bromacil + diuron	Krovar	—	Y	Y	—
Dazomet	Basamid	Y	—	—	—
Diquat	Reward, Aquatrim II	—	—	—	Y
Glufosinate-ammonium	Finale, Derringer	—	—	Y	Y
Glyphosate	Gly-Flo, Prosecutor, Razor, Roundup Pro & Pro Dry, Trailblazer, Touchdown Pro, + others	—	—	Y	—
Glyphosate + diquat dibromide	QuickPRO, Prosecutor Swift Acting	—	—	Y	Y
Imazapyr	Arsenal	—	Y	Y	—
Imazapyr + diuron	Sahara	—	Y	Y	—
Metam sodium	Metam CLR, Vapam HL, Soil Prep	Y	—	—	—
Methyl bromide	MB 98, MBC, Dowfume MC-2, Brom-o-gas, Profume, Terr-o-gas	Y	—	—	—
Pelargonic acid	Quik, Scythe	—	—	—	Y
Prometon	Pramitol, Spot	—	Y	—	—
Prometon + 2,4-D	Vegemec	—	Y	Y	Y
Tebuthiuron	Spike	—	Y	—	—

Y=yes.

PRE-PLANT NONSELECTIVE WEED CONTROL (Refer to Herbicide Label for Specific Use Listing)

Common Name	Trade Name (rate)	Weeds Controlled	Comments
Methyl bromide	Dowfume MC-2 Brom-o-gas Profume Terr-o-gas (1 to 2 lb/100 ft ²)	Non-selective, including bermudagrass, nutsedge, and soil pathogens & nematodes	Methyl bromide is formulated as liquid gas under pressure that forms a vapor when released. One to 1½ lb material is used per 100 sq.ft. treated soils. Use the higher rate when soils are heavy in texture, wet, or soil temperatures are below 60 F. Fumigation will not be effective if soil temperature is below 50 F. Soil should be moist but not saturated when treated. Before use, the soil should be in a condition suitable for planting including seedbed preparation by plowing soil 8 to 10 inches in depth, free of clods and undecomposed organic matter, then releasing the chemical under a gasproof (plastic) cover with the edges sealed and leaving it for 24 to 48 hours. Control will be only as deep as the soil is adequately tilled. Most other soil pests are also controlled. Grass can be planted 2 to 3 days after cover removal but do not disturb soil below 2 inches when planting. Unclassified herbicide family. Methyl bromide is a toxic material used by professional applicators only, slated to be phased out starting Jan. 1, 2005. Some methyl bromide formulations are Restricted Use Pesticides. Hiring a contractor who specializes in fumigation is recommended for those unfamiliar with the process. Chloropicrin is added as a warning agent and will irritate eyes and lungs. Weed seeds with hard, water-impermeable seed coats such as mallow, sicklepod, Carolina geranium, dichondra, bindweed, prickly sida, white clover, redstem filaree, and morningglory are not controlled by fumigants. If soil is too wet or dry, nutsedge control may be erratic.
Metam-sodium (metham)	Vapam 33% (50 to 100 gal/A) Vapam HL 42% (30 to 75 gal/A) Sectagon	Non-selective	Both products must first decompose to the biocidal ingredient, methyl isothiocyanate, thus, inconsistent pest control often results as temperature, plant residue, and soil moisture affect this conversion. A plastic or polyethylene cover is not required but increased control usually results with one. When a cover is not used a water soil-seal method should be followed. Cultivate the soil to the desired depth of fumigant penetration. Soil temperatures should be above 50F before use. Moisten the soil and use 1 to 2 pints of metham product per 100 sq.ft. in 2 to 5 gallons of water or 8 to 10 oz of Dazomet per 100 sq.ft. of prepared soil surface. The soil should then immediately be incorporated with a rotary tiller 4 to 8 inches deep and sealed with water at 15 gals. per 100 sq.ft. Light rolling will improve soil/water seal. If a cover is available, treat the soil in front of a rotary tiller. Cover the soil for 2 days. Planting may take place 2 to 3 weeks after treatment. Aeration may be required by rototilling before planting. Metham is a dithiocarbamate herbicide member. Read and follow all label directions. Metham is a restricted-use-pesticide while Dazomet is not. Control of legumes, sedges from seed, and morningglories with dazomet may be erratic.
Dazomet	Basamid 99 G (255 to 450 lb/A)		
glyphosate (4 lbs ai/A)	Roundup Pro/4S Touchdown Pro + others (4 to 5 qts/A)	Torpedograss, bermudagrass, nutsedges, other perennial weeds.	These are applied only to unwanted vegetation and will not control non-germinated seeds, diseases, nematodes, or other pests. Used also for edging and trimming. Use 4 to 5 quarts per acre glyphosate (4 lb/gal) for broadcast bermudagrass control. Apply to actively growing green vegetation that is at least 4 to 5 inches tall. Wait 2 to 3 weeks after application for regrowth and re-apply. A minimum of 3 applications will be required to control bermudagrass or torpedograss. Fusilade II at 24 oz/a can be mixed with glyphosate (4 lb/gal) at 3 qts/a and applied twice for comparable control of bermudagrass (~95%) to 3 applications of glyphosate alone. However, 14 days should lapse between the last treatment and seeding. For spot treatment, Glyphosate (4 lb/gal) is applied at 2 oz. per gallon of water; Reward 2EC is used at 4 teaspoons (¾ fl oz) + 1 teaspoon of nonionic surfactant per gallon of water, QuickPRO is used at 1.5 oz per gallon while Finale 1SC is used at 1½ to 4 fl oz per gallon of water without additional surfactant. Finale has limited translocation, thus, is good for edging creeping turfgrasses. Do not apply any of these products to desirable plants. Glyphosate and glufosinate are Amino Acid Derivative herbicide family members while diquat is a bipyridylum.
glyphosate + diquat (3.55 to 6.7 lbs)	QuickPRO 76 WG (4.5 to 9 lb/a) RazorBurn 3.11L (7.5 qts/a)	Non-selective.	
glufosinate (¾ to 1½ lbs ai/A)	Finale 1SC (¾ to 1½ gal/A)		
diquat (1 lb ai/A)	Reward 2EC (½ gal/A)		

PREEMERGENCE HERBICIDES¹ (Refer to Herbicide Label for Specific Species and Use Listing)

Comments. Preemergence herbicides work for 60 to 75 days and require repeat applications for season-long control. Approximate timing for preemergence crabgrass control are: March 1 in coastal and central areas and March 15-30 in Piedmont/Mountain areas. Goosegrass germinates approximately 3 to 4 weeks later than crabgrass. Annual bluegrass (annual biotypes) germinates in late summer into early fall when air temperatures drop consistently into the mid-70sF. This usually corresponds with September 15 to October 1 in coastal and central areas and September 1 to 15 in Piedmont/mountain areas. Germination is earliest in weak turf areas such as shade or wet conditions. Additional annual bluegrass germination also occurs in early winter with warm days and cold nights.

Adequate irrigation (0.25 in.) following herbicide application is necessary to ensure success. Benefin, oryzalin, pendimethalin, indaziflam, and prodiamine are not recommended on high traffic areas such as athletic fields, cart paths, par-three tees, and areas not well established. For these high traffic areas with goosegrass, use a product containing oxadiazon for annual grass control and simazine for broadleaf weed control. Many herbicides are formulated as "stand alone" products as well as on granules in combination with a dry fertilizer as "weed-and-feed" products. Fall seeded turfgrasses should not be treated with a preemergence herbicide until the following spring.

Preemergence Herbicide Efficacy Ratings (Refer to Herbicide Label for Specific Species and Use Listing)

Herbicide (trade name)	Crabgrass	Goosegrass	Annual bluegrass	Bittercress	Common Chickweed	FL Pusley	Foxtail, Yellow	Henbit	Lawn Burweed	Purslane	Phyllanthus sp.	Speedwell spp.	Spurges	Woodsorrel (Oxalis)
atrazine (Aatrex)	F ¹	P	E	E	E	G	P	E	G	G	-	E	G	F
benefin (Balan)	G-E	F	G-E	P	G	-	G	G	P	-	-	P	P	-
benefin+oryzalin (XL)	E	F-G	G	P	G	G	G	G	-	G	-	-	F	F-G
benefin+trifluralin (Team)	F-G	F	G	-	G	-	G	G	-	-	-	-	F	F
bensulide (Betasan, PreSan)	G-E	P-F	F	P	P	-	G	P	P	F	-	P	-	-
bensulide + oxadiazon (Goose/Crab)	E	G-E	G-E	-	G	-	G	-	-	-	-	-	G	-
dimethenamid (Tower)	G	F-G	-	G	G	G	-	G	-	G	-	-	G	G
dithiopyr (Dimension)	E	G	G-E	G	G	-	G	G	F	F	-	G	G	G
fenarimol (Rubigan)	P	P	G-E	-	P	P	-	P	P	-	-	P	P	P
indaziflam (Specticle)	E	E	E	G	-	-	G	-	-	-	-	-	-	-
isoxaben (Gallery)	P-F	P	P-F	E	E	F-G	P	G	E	G	-	G-E	G	G
mesotrione (Tenacity)	G	F-G	F	-	G	G	-	G	G	F	-	G	-	G
metolachlor (Pennant)	F-G	P-F	G	-	F	G	G	-	-	F	P	-	F	P
napropamide (Devrinol)	G-E	F	G	-	E	P	-	P	E	G	-	E	P	G
oryzalin (Surflan)	E	F-G	G-E	P	G	G	G	G	F	G	-	P	F-G	G
oxadiazon + prodiamine	E	G-E	G-E	G	G	G	G	G	F	G	F-G	G	G	G
oxadiazon (Ronstar)	G-E	E	G-E	P	P	G	G	P	P	G	F-G	G	G	G
pendimethalin (Pendulum)	E	F-G	G-E	G	E	G	G	G	G	G	F-G	G-E	G	G
prodiamine (Barricade)	E	F-G	G-E	G	G	G	G	G	F-G	G	F-G	F-G	G	G
pronamide (Kerb)	P-F	P	G-E	-	E	-	G	F-G	P	G	-	E	P	P
simazine (Princep T&O)	P-F	P	E	E	E	G	G	E	G-E	G	-	E	F-G	F

¹E=Excellent, >89% control; G=Good, 80 to 89% control; F=Fair, 70 to 79% control; P=Poor, <70% control; - = Data not available.

These are relative ratings and depend on many factors such as environmental conditions, turfgrass vigor or health, application timing, etc., and are intended only as a guide.

Turfgrass Tolerance to Preemergence Herbicides (Refer to Herbicide Label for Specific Turf Species Use Listing)

Herbicides (trade name)	Annual bluegrass	Bahiagrass	Bentgrass¹	Bermudagrass¹	Buffalograss	Creeping bentgrass	Centipedegrass	Kentucky bluegrass	Kikuyugrass	Overseeded Ryegrass	Perennial Ryegrass	Red Fescue	Seashore Paspalum	St. Augustinegrass	Tall Fescue	Zoysiagrass
atrazine (Aatrex)	NR	NR ²	NR	I (D)	I (D)	NR	S	NR	NR	NR	NR	NR	NR	S	NR	I-S
benefin (Balan)	I-S	S	NR	S	NR	S	S	S	NR	NR	S	S	NR	S	S	S
benefin + oryzalin (XL)	NR	S	NR	S	I (D)	NR	S	NR	NR	NR	NR	NR	NR	S	S	S
benefin + trifluralin (Team)	NR	S	NR	S	NR	S	S	S	NR	NR	S	S	NR	S	S	S
bensulide (Betasan, PreSan)	NR	S	S	S	NR	S	S	S	NR	I-S	S	S	NR	S	S	S
bensulide + oxadiazon	NR	NR	S	S	NR	S	NR	S	NR	NR	S	S	NR	NR	S	S
dimethenamid (Tower)	NR	NR	S	S	NR	NR	NR	I	NR	I	S	NR	S	S	S	S
dithiopyr (Dimension)	NR	S	S	S	S	S	S	S	S	I	S	I	S	S	S	S
ethofumesate (Prograss) ³	NR	NR	S	S(D)	NR	S	NR	I	NR	S(D)	S	I	NR	I	I	NR
indaziflam (Specticle)	NR	S	NR	S	S	NR	S	NR	NR	NR	NR	NR	NR	S	NR	S
isoxaben (Gallery)	NR	S	NR	S	S	S	S	S	NR	I-S	S	S	NR	S	S	S
fenarimol (Rubigan)	NR	NR	NR	S	NR	S	NR	S	NR	S	NR	S	NR	NR	S	NR
mesotrione (Tenacity)	NR	NR	NR	NR	NR	NR	S	S	NR	NR	S-I	S-I	NR	S-I	S-I	NR
metolachlor (Pennant)	NR	S	NR	I	NR	NR	S	S	NR	NR	NR	S	NR	S	S	S
napropamide (Devrinol)	NR	S	NR	S	NR	NR	S	NR	NR	NR	NR	NR	NR	S	S	NR
oryzalin (Surflan)	NR	S	NR	S	S	S	S	NR	NR	NR	NR	NR	NR	S	I	S
oxadiazon (Ronstar)	NR	NR	NR	S	S	NR	NR	S	NR	I	S	S	S	S	S	S
pendimethalin (Pre-M)	S	S	NR	S	S	S	S	S	NR	NR	S	S	NR	S	S	S
prodiamine (Barricade)	NR	S	NR	S	S	S	S	S	NR	I	S	S	S	S	S	S
pronamide (Kerb)	NR	S	NR	S	S	NR	S	NR	NR	NR	NR	NR	NR	S	NR	S
siduron (Tupersan)	S	NR	I	NR	NR	S	NR	S	NR	NR	S	S	NR	NR	S	S
simazine (Princep)	NR	NR	NR	I (D)	NR	NR	S	NR	NR	NR	NR	NR	NR	S	NR	S

¹Check herbicide label to determine if product can be used on golf course putting greens.

²S=Safe at labeled rates on mature, healthy turf; I=Intermediate safety - may cause slight damage to mature, healthy turf. Use only one-half the normal rate when temperatures are hot (>85 F) or if the turf is under water stress; NR=Not Registered for use on and/or damages this turf species.

³Ethofumesate is labeled only for Dormant (D) bermudagrass overseeded with perennial ryegrass.

These are relative rankings and depend on factors such as environmental conditions, turfgrass vigor or health, application timing, etc., and are intended only as a guide.

Preemergence Herbicides for Putting Greens (Refer to Herbicide Label for Specific Turf Species Use Listing).

Trade Names	Ingredients	Bentgrass	Bermudagrass	Bermudagrass to be Overseeded (refer to label for specific timing)
Weedgrass Preventer	bensulide	Y	Y	Y
Goosegrass/Crabgrass Control	bensulide + oxadiazon	Y	Y	—
Fertilizers with 0.164% dithiopyr	dithiopyr	Y	Y	—
Southern Weedgrass Control	pendimethalin	—	Y	—
Devrinol	napronamide	—	Y	—
Betasan	bensulide	Y	Y	Y
Kerb	pronamide	—	Y	Y
Revolver	foramsulfuron	—	—	Y
Rubigan	fenarimol	—	Y	Y
Tupersan	siduron	Y	—	—

Y=yes.

PRE-PLANT HERBICIDES (Refer to Herbicide Label for Specific Turf Species Use Listing)¹

COMMON NAME (lbs ai/acre) ²	TRADE NAME EXAMPLES (rate of product/acre)	WEEDS CONTROLLED	TURFGRASS USE	COMMENTS
atrazine/simazine (1 to 2 lbs-sandy soil) (4 lbs-muck soil)	Atrazine Aatrex 4L (1-2 qts), 90DG (1.1-2.2 lbs), 80W (1.2-2.5 lbs); Purge Simazine Princep 90DF, 4L + others	Pre-plant for many broadleaf weeds and suppression of crabgrass	Pre-plant centipede grass seeding and pre-plant St. Augustinegrass, centipede grass, & zoysiagrass sprigging/sodding	Apply to centipede grass & St. Augustine grass plus only dormant bermudagrass & zoysiagrass. Do not use on desirable cool-season grasses. Will provide good to excellent weed control with a minimum of growth retardation to newly sprigged, sodded, or plugged turf areas at rates not in excess of 1 lb ai/A. Effectiveness will be reduced as weeds mature. Two applications are allowed per year. Do not use during spring greenup. Do not apply within the root zone of ornamentals nor within 4 months of overseeding. Atrazine is a Restricted Use Pesticide. Triazine herbicides.
mesotrione (0.125 to 0.25 lb)	Tenacity 4L (4 to 8 fl.oz.)	Pre-plant crabgrass, chickweed, speedwells, + others	Ky. bluegrass, tall fescue, perennial ryegrass, centipede grass, St. Augustine grass	A postemergence (primary) herbicide with some preemergence activity. Apply at grass seeding in at least 30 GPA (280 L/ha) Activate with 0.15-inch (3.8 mm) irrigation. Do not use on bentgrass, Poa annua, kikuyugrass, zoysiagrass, seashore paspalum, and bermudagrass.
metolachlor (1.8 to 3.9 lbs)	Pennant 7.8L (2 to 4 pts)	Pre-plant yellow nutsedge, annual sedge, sprangletop, some annual grasses	Pre-plant centipede grass, St. Augustine grass, and zoysiagrass sprigging	The higher rate will be necessary for turf grown on high organic (i.e., muck) soils. For commercial St. Augustine grass sod production, do not use more than once every 6 weeks and do not apply more than 8 pts./A/yr. Tank mixing with atrazine will increase the weed control spectrum. Irrigate within 7 days after application. Acetanilide herbicide.
oxadiazon (2 to 4 lbs)	Ronstar 2G (100 to 200 lbs) Ronstar 50W (4 to 6 lbs) Ronstar Flo 3.17L (2.5 to 3.8 qts)	Pre-plant annual grasses, especially goosegrass	Post-planting bermudagrass and zoysiagrass sprigging	Safest preemergence herbicide on newly sprigged or high traffic areas. Apply to dry turf and irrigate immediately after application. Apply the wettable powder (W) and liquid (L) formulation only to bare ground or dormant turf. Oxadiazole (or Triazolinone) herbicide.
quinclorac (0.75 lb)	Drive 75 DF (1 lb) Drive XLR8 1.5L (0.5 gal)	Pre-plant crabgrass, signalgrass, barnyardgrass, foxtail, broadleaf weeds such as pennywort, speedwells, dandelion, black medic, white clover, violets	Pre-plant seeding of annual bluegrass, ryegrass, bentgrass fairways, common bermuda, Kentucky bluegrass, tall fescue, zoysiagrass	Good soil moisture should be present before treatment. Creeping bentgrass, hybrid bermudagrass, & fine fescue have intermediate tolerance. Do not apply to desirable bahiagrass, centipede grass, St. Augustine grass, or dichondra. Tank mixing with N or Fe may lessen turf discoloration. Add a crop oil concentrate (2 pts/a) or methylated seed oil (1.5 pts/a) to increase performance. Not labeled for golf greens or collars. Avoid drift onto ornamentals. Quinolinecarboxylic Acid herbicide.
siduron (8 to 12 lbs)	Tupersan 50WP (16 to 24 lbs)	Pre-plant crabgrass control	Pre-seeding cool-season turfgrasses	Provides ~30 days preemergence control of crabgrass in newly seeded Ky. bluegrass or fescue (red or tall) areas. Do not use on warm-season grasses. At least ½-inch of water is needed within 3 days of application for preemergence activity. Substituted urea herbicide.

PREEMERGENCE HERBICIDES (Refer to Herbicide Label for Specific Turf Species Use Listing)¹

COMMON NAME (lbs ai/acre)²	TRADE NAME EXAMPLES (rate of product/acre)	WEEDS CONTROLLED	TURFGRASS USE	COMMENTS
atrazine/simazine (2.0 lbs-sandy soil) (4.0 lbs-muck soil)	Atrazine Aatrex 4L (1-2 qts), 90DG (1.1-2.2 lbs), 80W (1.2-2.5 lbs); Purge Simazine Princep 90DF, 4L Wynstar 90DF + others	Same as for benefin plus pennywort (dollarweed), henbit, chickweed, lawn burweed (or spurweed) and some annual sedges. Perennial broadleaf weeds such as wild garlic, dock & others usually escape.	Centipedegrass St. Augustinegrass Zoysiagrass Dormant Bermuda	Apply to centipedegrass & St. Augustinegrass plus only dormant bermudagrass & zoysiagrass. Use in dormant bermudagrass in early December plus February for winter weed control. Do not use on desirable cool-season grasses. Will provide good to excellent weed control with a minimum of growth retardation to newly sprigged, sodded, or plugged turf areas at rates not in excess of 1 lb ai/A. Effectiveness will be reduced as weeds mature. Two applications are allowed per year. Do not use during spring greenup. Pennywort is easiest to control with a late fall and/or early winter application followed by a repeat application 4 to 6 weeks later. Winter weed control also is best with fall applications. Avoid application during spring green-up. Do not apply within the root zone of ornamentals nor within 4 months of overseeding. Atrazine is a Restricted Use Pesticide. Triazine herbicides.
benefin (2 to 3 lbs)	Balan 2.5G (80 to 120 lbs) 2.5 Benefin G (80 to 120 lbs) Balan 1.5EC (1a to 2 gal)	Summer annual grasses, annual bluegrass, some selected annual broadleaves.	Established Bahia grass Bermudagrass Centipedegrass Kentucky bluegrass Red fescue St. Augustinegrass Tall fescue Zoysiagrass	Apply only to well-established turf before annual weed seed germination. Due to short residual life, for continued weed control, a second application 60 to 75 days after the initial is required. For annual bluegrass control, use full rate in September. Wait to reseed or overseed with ryegrass 6 weeks following the low herbicidal rate and 12 to 16 weeks after for the high herbicidal rate. Minimum 3 month waiting period is required before sprigging or sodding. Read the label for irrigation requirements to activate the herbicide. DO NOT APPLY TO IMMATURE TURF , desirable overseeding, on golf greens, or make a spring application to fall-planted turfgrasses. Dinitroaniline herbicide.
benefin (¾ -1.13 lbs) + trifluralin (¾ -1.5 lb)	Team 2G (100 to 150 lbs) Team Pro 0.86 G (175 to 350 lbs)			Same as for benefin. For use by professional applicators only. Good for use in mixed stands containing cool and warm-season turfgrasses. Wait to reseed or overseed with ryegrass 8 weeks following the low herbicidal rate and 12 to 16 weeks after for the high herbicidal rate. Team Pro is a dry fertilizer based material containing 0.43% benefin + 0.43% trifluralin. Dinitroaniline herbicides.
bensulide (7½ to 12½ lbs)	Betasan 3.6G (209-348 lbs) Pre-San, Lescosan 7G (107-180 lbs) Pre-San 12.5G (60-100 lbs) Bensumec, Lescosan 4E (1.9-3.1 gal) ProTurf Weedgrass Preventer 8.5G (88-147 lbs)			Same as for benefin. Use high rate in fall for annual bluegrass control. Safe on overseeded areas and golf greens. If used on putting greens, apply 4 months before overseeding. Apply a light irrigation following all applications. Sulfonamide herbicide.

PREEMERGENCE HERBICIDES (Refer to Herbicide Label for Specific Turf Species Use Listing)¹

COMMON NAME (lbs ai/acre)²	TRADE NAME EXAMPLES (rate of product/acre)	WEEDS CONTROLLED	TURFGRASS USE	COMMENTS
dimethenamid-P (1 to 1.5 lbs ai/acre)	Tower 6L (21 to 32 oz)	Small seeded broadleaf weeds like doveweed, spurge, purslane + yellow nutsedge & some annual grasses.		Safe on established cool- and warm-season turfgrass species. Use sites include golf courses (not greens) and highway rights-of-ways but not residential or recreational turfgrass, lawns, or sod farms. Repeat applications will be needed in 6 (21 oz/a rate) to 8 (32 oz/a rate) weeks. A total yearly allowance is 64 oz/acre. A combination of dimethenamid & pendamethalin is available as Freehand.1.75G.
dithiopyr (½ lbs)	Dimension 1E (½ gal) Dimension Ultra 40WSP (0.95 lbs)	Same as for benefin, plus oxalis (woodsorrel)		Same as for benefin. Do not use within 3 months of seeding or sprigging. A total of 1½ lb ai/A is allowed yearly not to exceed ½ lb ai/A per application. Provides early (1 to 3 leaf stage) postemergence crabgrass (some species) control. For preemergence <i>Poa annua</i> control, a 8 week interval is needed before ryegrass overseeding. Refer to label for additional timing and rate options. Each 5 oz water soluble bag of Dimension Ultra 40WSP contains 0.125 lb dithiopyr. Pyridine herbicide.
fenarimol (see comment)	Rubigan 1AS (see comment)	Annual bluegrass; also a fungicide	Bermudagrass	A systemic fungicide that reduces <i>Poa annua</i> populations. Use 3 applications spaced 10-14 days apart with the third 2 weeks prior to ryegrass overseeding and 30 days prior to <i>Poa trivialis</i> or bentgrass overseeding. Use 4 oz/1000 sq.ft. each for 3 applications; or 6 oz/1000 sq.ft. each if 2 applications are used instead of 3. In heavy weed pressure sites, a follow-up of 2 oz/1000 sq.ft. will be needed in early January for season-long control. See supplemental label for more information. DeMethylation Inhibitor (DMI) fungicide. NOTE: This product will voluntarily become unavailable in 2014.
flumioxazin (0.375 lbs)	SureGuard 51WDG (12 oz/acre)	Winter annual broadleaf weeds, preemergence crabgrass	Dormant bermudagrass	A contact product for dormant bermudagrass for rapid postemergence nonselective winter annual broadleaf control with subsequent preemergence crabgrass control. Best winter annual broadleaf control is with early winter applications. Best preemergence crabgrass control are with late winter applications. Allow 8 weeks after application before seeding or sodding. BroadStar 0.25G is a granular formulation. Dicarboximide herbicide.
indazaflam (0.027 to 0.047 lb or 30 to 80 g ai/ha) 0.027 to 0.044 lb	Specticle 20WP (2.1 to 3.75 oz) Specticle 0.622L (5.4 to 10 oz)	Goosegrass, crabgrass, annual bluegrass plus various broadleaves	Established Bermudagrass, Zoysiagrass, Centipedegrass, St. Augustinegrass	Do not use on cool-season turfgrasses or on bahiagrass or Seashore Paspalum. Turf must be well established before use. Possesses long soil residual, thus, has extended, sprigging, seeding and overseeding restriction occur. A 15-ft buffer is suggested between treated areas and adjacent cool-season grasses. Cellulose biosynthesis inhibitor. Alkalyazine herbicide.

PREEMERGENCE HERBICIDES (Refer to Herbicide Label for Specific Turf Species Use Listing)¹

COMMON NAME (lbs ai/acre)²	TRADE NAME EXAMPLES (rate of product/acre)	WEEDS CONTROLLED	TURFGRASS USE	COMMENTS
isoxaben (½ to 1 lb)	Gallery 75W (0.66 to 1.33 lbs)	Broadleaves such as chickweed, clover, henbit, bittercress, spurge, plantain, and others	Bahiagrass Buffalograss Bentgrass Bermudagrass Centipedegrass Chewings Fescue Perennial Ryegrass St. Augustinegrass Tall Fescue Zoysiagrass	Control is best for annual broadleaf weeds. Tank mix with another preemergence grass herbicide for satisfactory grass weed control. In order to activate the material, ½" water is needed following application. Not labeled for golf greens or tees. Do not reseed nor overseed within 60 days after application. Do not apply to newly seeded turf until it has been mowed 3 times. Benzamide herbicide.
metolachlor (1.8 to 3.9 lbs)	Pennant Magnum 7.62 L (1.9 to 4.1 pts)	Yellow nutsedge, annual sedge, sprangletop, some annual grass (e.g., crabgrass) suppression	Established bermudagrass golf course fairways; zoysiagrass, centipedegrass and St. Augustinegrass sod farms and commercial lawns	The higher rate will be necessary for turf grown on high organic (i.e., muck) soils. For commercial St. Augustinegrass sod production, do not use more than once every 6 weeks and do not apply more than 8 pts./A/yr. Tank mixing with atrazine will increase the weed control spectrum. Do not use Pennant on golf greens, tees, or aprons or within 4 months of overseeding or 6 months after overseeding. Irrigate within 7 days after application. Acetanilide herbicide.
napropamide (2.0 lbs)	Devrinol 50WP (4.0 lbs) Devrinol 2G (100 lbs) Devrinol 5G (40 lbs)	Same as for benefin	Established Bahiagrass Bermudagrass Centipedegrass Kentucky bluegrass Red Fescue St. Augustinegrass Tall Fescue Zoysiagrass	Do not apply to immature turf less than 3 months old. A second application 8 to 10 weeks after the first is suggested. Check specific label for putting greens use. Use the reduced rates for turf maintained at lower mowing heights. Irrigate after application. Do not reseed or overseed within six months after application. Susceptibility of cool-season turfgrasses may limit its use in overseed turf. Amide herbicide.
oryzalin (1½ to 3 lbs)	Surflan 4AS (1½ to 3 qts)	Same as for benefin, plus goosegrass	St. Augustinegrass Tall Fescue Zoysiagrass	Same as for benefin. Use a 1½ + 1½ lb ai/A split application approximately 60 to 75 days apart for best results. Most stable preemergence herbicide, allowing 21 days before rainfall or irrigation is needed for activation. Wait to reseed or overseed with ryegrass 90 to 120 days following application. Spring application on overseeded, cool-season grasses may prematurely thin them. Dinitroaniline herbicide.
oryzalin (1-1½ lbs) + benefin (1-1½ lbs)	XL 2G (100 to 150 lbs)			Same as for benefin. Dinitroaniline herbicide.

PREEMERGENCE HERBICIDES (Refer to Herbicide Label for Specific Turf Species Use Listing)¹

COMMON NAME (lbs ai/acre) ²	TRADE NAME EXAMPLES (rate of product/acre)	WEEDS CONTROLLED	TURFGRASS USE	COMMENTS
oxadiazon (2 to 4 lbs)	Ronstar 2G (100 to 200 lbs) Ronstar 50W (4 to 6 lbs) Ronstar Flo 3.17L (2.5 to 3.8 qts)	Same as for benfenin, especially for goosegrass	Bermudagrass Buffalograss Kentucky Bluegrass Seashore Paspalum St. Augustinegrass Tall Fescue Zoysiagrass	Do not apply to wet turf, golf greens, or to home lawns. Ronstar 50WP and Flo can be used only on dormant bermudagrass, St. Augustinegrass, or zoysiagrass turf or excessive phytotoxicity will result. Thoroughly irrigate following application to increase effectiveness. A combination of oxadiazon (1%) plus benfenin (0.5%) on a 38% ureaformaldehyde nitrogen fertilizer is available as Regal Star. Apply at 200 lbs/a (2 + 1 lbs ai oxadiazon + benfenin/a). Another combination of oxadiazon + prodiamine is available as Regalstar II 1.2G. It is on a 38% UF nitrogen fertilizer and is applied at 200 lbs/A (2 + 0.4 lbs ai oxadiazon + prodiamine/A). Oxadiazole (or Triazolinone) herbicide.
oxadiazon (1½ lb) + bensulide (6 lbs)	Goosegrass/Crabgrass Control 6.56 G (115 lbs)	Same as for benfenin, plus goosegrass, oxalis, speedwell		Same as for oxadiazon. On overseeded golf greens, apply one-half maximum labeled rate to dry turf followed by the other half 10 days later. See label for precaution concerning use on putting greens. Contains 5.25% bensulide + 1.31% oxadiazon. Apply only to dry turf and when temperatures are <80F & irrigate-in immediately with ¼ to ½-inch water. Do not overlap on greens.
pendimethalin (1.5 to 3.0)	Pendulum 60 DF Pendulum Aquacap (see label)	Same as for benfenin plus oxalis and speedwell.	Same as for benfenin.	Do not use on newly sprigged turfgrasses. Not recommended for areas thinned from winter stress. Do not reseed within 4 months of application. Use low rate on tall fescue and Kentucky bluegrass, high rate may be used on warm-season grasses.
prodiamine (¾ lbs)	Barricade 65WG (1.15 lbs) Barricade 4L (1½ pints) ProCclipse 65 WDG (1.15 lbs) RegalKade (check label)	Same as for benfenin plus chickweed, spurge, goosegrass	Established Bahagrass Bermudagrass Centipedegrass Kentucky bluegrass Red Fescue St. Augustinegrass Tall Fescue Zoysiagrass	Same as for benfenin. Split applications at 0.38 to 0.75 lbs ai/A 60 to 75 days apart should be used for extended control and will be required for goosegrass suppression. May be applied to established ryegrass. Do not apply more than twice yearly or to golf greens. RegalKade formulations are on a 32-3-12 dry fertilizer carrier and include a 0.5G and 0.37G formulation. Dinitroaniline herbicide.
pronamide (½ to 1 lb)	Kerb T/O 50 W (1 to 2 lbs)	Annual bluegrass	All warm-season grasses	Safe on all warm-season grasses. Use PRE and POST only on bermudagrass. For PRE, make application at 45 to 60 days prior to overseeding. Activated charcoal can be used at 2 to 5 lbs/1000 sq.ft. to “deactivate” pronamide when applied closer than 45 days prior to overseeding. Inconsistency between years may occur with the charcoal approach. Works slowly (3 to 5 weeks); use high rate as annual bluegrass reaches maturity. Do not apply on or upslope to desirable cool-season turf as pronamide will move with runoff. Restricted Use Product. Amide herbicide.

¹Presence of a herbicide in this listing does not constitute a recommendation. Trade names are used with the understanding that no endorsement is intended or no criticism is implied of similar products which are not mentioned. All chemicals should be used in accordance with the manufacturer's instructions.

²All herbicide rates are active ingredient rates per acre. For product rates for formulations not listed, check the label included with every herbicide container. The following conversions may be useful. Gal/acre x 2.938 = oz/1000 ft²; Qt/acre x 0.7346 = oz/1000 ft²; Pint/acre x 0.3673 = oz/1000 ft²; lbs/acre x 0.02296 = lb/1000 ft².

POSTEMERGENCE HERBICIDES (Refer to Herbicide Label for Specific Turf Species Use Listing)

Best results occur when young, actively growing weeds are treated with good soil moisture and air temperatures <85 F (29 C). Repeat applications, 10 to 14 days apart, may be required for acceptable control. Do not mow or irrigate within 48 hrs after application for most chemicals. Read the label to see if a spreader-sticker, adjuvant, crop oil, or wetting agent are needed.

Established Turfgrass Tolerance to Postemergence Broadleaf Herbicides (Refer to Herbicide Label for Specific Species Listing)

Herbicides	Bahiagrass	Bentgrass Fairways	Bentgrass Greens	Bermudagrass	Buffalograss	Carpetgrass	Centipedegrass	Fine Fescue	Kentucky bluegrass	Kikuyugrass	Overseeded Ryegrass/Blends	Ryegrass	Seashore Paspalum	St. Augustinegrass	Tall Fescue	Zoysiagrass
amicarbazone (Xonerate)	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
aminocyclopyrachlor (Imprelis)	S	NR	NR	NR	NR	NR	NR	S	S	NR	S	S	NR	NR	S	S
atrazine (Aatrex)	NR ¹	NR	NR	S-I(D)	I (D)	I ²	S	NR	NR	NR	NR	NR	NR	S	NR	I
bentazon (Basagran T&O)	S	I	NR-I	S	S	S	S	S	S	NR	S-I	S	S-NR	S	S	S
bromoxynil (Buctril)	S	NR	NR	S	NR	S	S	S	S	NR	S	S	NR	S	S	S
carfentrazone (QuickSilver)	S	S	NR	S	S	NR	S	S	S	NR	S	S	S	I	S	S
carfen.+2,4-D+MCP+dicamba (Speed Zone North.)	NR	S	NR	S	NR	NR	NR	S	S	NR	S	S	NR	NR	S	S
carfen.+MCPA+MCP+dicamba (Power Zone)	NR	NR	NR	S	NR	NR	NR	S	S	NR	S	S	NR	NR	S	S
carfen.+2,4-D+MCP+dicamba (Speed Zone So.)	S	S	NR	S	S	NR	S	S	S	NR	S	S	S	S	S	S
chlorsulfuron (Corsair, TFC)	I	I	NR	S	NR	I	I	I-S	S	NR	NR	NR	S	I	NR	I
clopyralid (Lontrel)	S	I	NR	S	S	S	S	S	S	NR	S	S	NR	S	S	S
2,4-D	S	NR	I ¹	S	I	I	S-I	S	S	S	S-I	S	S	I	S	S
MCP (mecoprop)	S	I	S	S	I	I	I	S	S	NR	I	S	S	I	S	S
dicamba (Vanquish)	S	I	I	S	I-NR	I	I	S	S	NR	I	S	S	I	S	S
2,4-D + dichlorprop (2,4-DP)	S	I	I	S	S	I	I	S	S	S	S	S	S	I	S	S
2,4-D + triclopyr (Turflon)	NR	NR	NR-I	NR	NR	NR	NR	I	S	NR	S	S	NR-P	NR	S	NR
2,4-D + MCP + dicamba	S	I	I	S	I	I	I	S	S	NR	S	S	NR	I	S	S
2,4-D + MCP + 2,4-DP	S	I	I	S	NR	I	I	S	S	NR	S	S	NR	I	S	S
MCPA + MCP + 2,4-DP	S	I	I	S	NR	I	I	S	S	NR	S	S	NR	I	S	I
MCPA + triclopyr + clopyralid	S	S	S	S	S	I	S	S	S	NR	S	S	NR	NR	S	S
flumioxazin (SureGuard)	NR	D	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
fluroxypyr + 2,4-D + dicamba (Escalade)	S	I	NR	S	NR	NR	NR	S	S	NR	NR	S	NR	NR	S	S
fluroxypyr (Spotlight)	S	S	NR	S	S	S	S	S	S	S	S	S	S	S	S	S
halosulfuron (Sedgehammer)	S	I	NR	S	NR	S	S	S	S	S	S	S	S	S	S	S
iodosulfuron + dicamba + thiencarbazone (Celsius)	NR	S	NR	S	S	NR	S	NR	NR	NR	NR	NR	NR	S	NR	S
imazapic (Plateau)	NR	NR	NR	S	NR	NR	S	NR	NR	NR	NR	NR	NR	NR	NR	NR
imazaquin (Image)	NR	NR	NR	S-I	S-NR	I	S	NR	NR	NR	NR	NR	NR	S	NR	S
mesotrione (Tenacity)	NR	NR	NR	NR	NR	NR	S	S-I	S	NR	NR	S-I	NR	S-I	S-I	NR
metsulfuron (Manor)	NR	NR	NR	S	S	I	S	I	I	NR	NR	NR	NR-S	S-I	NR	S
pyraflufen-ethyl (Octane)	S	S	NR	S	S	NR	S-I	S	S	S	S	S	NR	S	S	S
quinclorac (Drive)	NR	I	NR	S	S	NR	NR	NR	S	NR	S	S	NR-S	NR	S	S
quinclorac+sulfentrazone+2,4-D+dicamba (Q4)	NR	NR	NR	NR-I	NR-I	NR	NR	S	S	NR-I	S	S		NR	S	NR-I
simazine (Princep T&O)	NR	NR	NR	S-I(D)	S	I	S-I	NR	NR	NR	NR	NR	NR	S-I	NR	I
sulfentrazone (Dismiss)	S	S	NR	S	S	S	S	I	S	S	NR	S	S	NR	I	S
sulfentrazone + 2,4-D + dicamba + MCP (Surge)	S	S	NR	S	S	S	S	S	S	S	S	S	NR	S	S	S
triclopyr (Turflon)	NR	NR	NR	NR	NR	NR	NR	S	S	NR	S	S	NR-P	NR	S	NR
triclopyr + clopyralid (Confront)	I	I	NR	I	S	NR	S	I	S	NR	S	S	NR-I	NR	S	S
triclopyr + dicamba + 2,4-D + sulfentrazone (Tzone)	S	S	NR	S	NR	NR	NR	S	S	NR	S	S	NR	NR	S	S

D=apply only to dormant grass.

Established Turfgrass Tolerance to Postemergence Grass Herbicides (Refer to Herbicide Label for Specific Species Listing).

Herbicides (trade names)	Bahiagrass	Bent grass Fairways	Bent grass Greens	Bermudagrass	Buffalograss	Carpetgrass	Centipede grass	Fine Fescue	Kentucky bluegrass	Kikuyu-grass	Overseeded Ryegrass/Blends	Ryegrass	Seashore Paspalum	St. Augustinegrass	Tall Fescue	Zoysiagrass
Grass Weed Control																
amicarbazone (Xonerate)	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
asulam (Asulox)	NR	NR	NR ¹	S-I ²	NR-I	NR	NR	NR	NR	NR	NR	NR	NR	S-I	NR	NR-I
bispyribac-sodium (Velocity) ³	NR	NR	NR	S ³	NR	NR	NR	NR	NR	NR	S ⁴	S	NR	NR	NR	NR
clethodim (Envoy)	NR	NR	NR	NR	NR	NR	S	NR	NR	NR	NR	NR	NR	NR	NR	NR
diclofop (Illoxan)	NR	NR	NR	S	NR-S	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
DSMA, MSMA, CMA	NR	I	NR-I	S-I	I	NR	NR	I	I	NR	NR	S-I	NR-P	NR	I	S-I
ethofumesate (Prograss) ⁴	NR	I	NR-I	D	NR	NR	NR	I	S	NR	I	S	NR-S	NR	S	NR
fenoxaprop (Acclaim Extra)	NR-I	I	NR-I	NR-I	NR	NR	NR	S	S	NR	I	S	NR	NR	S	I
flazasulfuron (Katana)	NR	S	NR	S	S	NR	S	NR	NR	NR	NR	NR	S	NR	NR	S
fluazifop (Fusilade II)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR-P	NR	S-I	I
foramsulfuron (Revolver)	NR	NR	NR	S	NR	NR	NR	NR	NR	NR	NR	NR	NR	I	NR	S
mesotrione (Tenacity)	NR	NR	NR	NR	NR	NR	S	S-I	S	NR	NR	S-I	NR	S-I	S-I	NR
metribuzin (Sencor Turf)	NR	NR	NR	S-I	NR	NR	NR	NR	NR	NR	NR	NR	NR-I	NR	NR	NR
pronamide (Kerb)	S	NR	NR	S	NR	NR	S	NR	NR	NR	NR	NR	NR-S	S	NR	S
rimsulfuron (TranXit)	NR	NR	NR	S	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
sethoxydim (Vantage)	NR	NR	NR	NR	NR	NR	S	S	NR	NR	NR	NR	NR-P	NR	NR	NR
sulfosulfuron (Certainty)	I	NR	NR	S	S	NR	S-I	NR	NR	S	NR	NR	NR	S-I	NR	S
trifloxysulfuron (Monument)	NR	NR	NR	S	NR	NR	NR	NR	NR	NR	NR	NR	NR-P	NR	NR	S
quinclorac (Drive)	NR	I	NR	S-I	S	NR	NR	I	S	NR	S	S	NR-S	NR	S	S

¹S=Safe at labeled rates; I=Intermediate safety, use at reduced rates; NR=Not Registered for use on and/or damages this turfgrass; D=Dormant turf only.

²Asulam is labeled for 'Tifway' (419) Bermudagrass and St. Augustinegrass.

³Used on dormant bermudagrass overseeded with perennial ryegrass.

These are relative rankings and depend on factors such as environmental conditions, turfgrass vigor or health, application timing, etc., and are intended only as a guide.

Guide to Grass Weed Control with Postemergence Turfgrass Herbicides (Refer to Herbicide Label for Specific Turf Species Use Listing)

Herbicide ¹	Crabgrass	Goosegrass	Annual Bluegrass	Sandspur	Dallisgrass	Thin Paspalum	Ryegrass	Smutgrass	Bahiagrass	Carpetgrass	Tall Fescue	Bermudagrass	Quackgrass
amicarbazone (Xonerate)	F-G	P	F-G	—	P	P	P	P	P	P	P	P	—
atrazine (Aatrex)	P-F ²	P	G-E	F	P	P	G-E	F-G	F	P	F	P-F	F
asulam (Asulox)	G	F	P	F	P	P-F	—	F	P	G	P	P	—
bispyribac-sodium (Velocity)	—	—	G	—	—	—	P	—	—	—	—	P	—
chlorsulfuron (Corsair, TFC)	P	P	P	P	P	P	G	F	P	P	G	P	—
clethodim (Envoy)	E	G-E	G	G	—	—	G-E	—	—	—	P	G	G
diclofop (Illoxan)	P	G-E	P	P	P	P	G	P	P	P	P	P	—
DSMA, MSMA	G	F	P	G	F	F-G	P	P	F	G	P	P	—
ethofumesate (Prograss)	P	P	F-G*	P	P	P	P	P	P	—	P	P-G	—
fenoxaprop (Acclaim)	G-E	G-E	P	G	P	P	P	P	G	—	P	F-G	—
flazasulfuron (Katana)	F	P	G-E	—	—	—	G-E	—	—	—	F-G	P	—
fluzazifop (Fusilade II)	G-E	G	F	G	P	P	G-E	P	G	—	P	G	G
foramsulfuron (Revolver)	P	G	E	—	F	—	E	—	—	—	E	P	—
imazapic (Plateau)	G	G	P	F-G	F	—	F	—	F	—	G	P	P
metribuzin (Sencor)	F-G	G-E	G	—	F	P	F	P	P	—	F	P	—
metsulfuron (Manor)	P	P	P	P	P	P	G	P	G	P	F	P	—
pronamide (Kerb)	P	P	G-E	P	P	P	G-E	P	P	—	G	P	F-G
rimsulfuron (TranXit)	P	P	G	P	P	P	G	P	P	P	P	P	P
sethoxydim (Vantage)	G-E	G	P	G	P-F	P	P	P	G	P	P	F-G	F-G
simazine (Princep T&O)	P-F	P	G-E	P-F	P	P	G-E	F	F	P	F	P-F	F
sulfosulfuron (Certainty)	P	P	G	—	P	P	P	—	P	P	G	P	G
trifloxysulfuron (Monument)	P	P	E	—	F	—	E	—	F	—	E	P	—
quinclorac (Drive)	E	P	P	—	F	P	P	P	P	P	P	P	—

¹Repeat applications usually 5 to 14 days apart are needed for most herbicides and weeds. This is especially true as weeds mature, producing flowers and seedheads.

²E = excellent (>90%) control with one application;

G = good (80 to 90%) control with one application;

F = Fair to good (70 to 89%), good control sometimes with high rates, however a repeat treatment 1 to 3 weeks later each at the standard or reduced rate is usually more effective; P = poor (<70%) control in most cases.

— = Control unknown as all weeds have not been tested for susceptibility to each herbicide listed.

*Ethofumesate provides good to excellent control of most true annual biotypes of annual bluegrass but only poor to fair control of perennial biotypes.

Expected control of broadleaf weeds with turf herbicides (consult specific herbicide label for weed species listing).

Weed	Lifecycle	Aminocarbazono	Aminocyclopyrachlor	Atrazine/Simazine	2,4-D	MCPP	Dicamba	2,4-D + MCPP	2,4-D + 2,4-DP	2,4-D + MCPP + dicamba	Carfentrazone	Carfentrazone + 2,4-D + MCPP + MCPA &/or dicamba	Chlorsulfuron	Clopyralid	Flumioxazin	Fluroxypyr	Fluroxypyr + 2,4-D + dicamba	Imazaquin	Iodosulfuron-dicamba + thienencarbazono	Mesotrione	Metsulfuron	Pyraflufen-ethyl	Quinclorac	Quinclorac + 2,4-D + sulfentrazone + dicamba	Triclopyr	2,4-D + triclopyr	Triclopyr + clopyralid	MCPA + triclopyr + clopyralid	Sulfentrazone + 2,4-D + MCPP + dicamba	Sulfentrazone	Triclopyr + dicamba + sulfentrazone + 2,4-D	
Aster	P ¹	—	—	—	G	—	—	F	G	F	—	G	—	G	—	—	G	—	G	—	G	—	—	G	—	F	G	G	G	—	G	
Bedstraw, smooth	P	—	—	—	P	P-F	G	F	F	G	—	G	G	—	—	E	G	—	—	—	P	G	—	G	F-G	G	G	G	G	—	G	
Beggarticks	A	—	—	G	G	—	—	—	G	G	—	G	—	—	—	—	G	—	—	—	—	G	—	E	—	G	G	G	—	—	G	
Betony, Florida	P	—	E	F-G ²	F	F	F-G	F	F-G	F-G	—	G	—	—	—	—	G	—	—	G	G	—	—	G	—	G	G	—	G	—	G	
Bittercress, hairy	WA	G	G	—	E	F	E	E	E	E	—	—	—	G	—	—	G	G	—	—	E	—	—	—	—	—	—	—	—	—	G	
Bindweed, field	P	—	—	—	G	G	G	E-F	G	E	—	G	—	—	—	G	G	—	—	—	—	—	E	G	G	G	—	—	—	F-G	—	G
Burclover	A	—	—	—	F-P	E	E	E-F	E	E	—	G	F	G	—	—	G	—	—	—	G	—	—	—	G	—	—	—	—	F-G	—	—
Buttercups	WA,B&P	—	—	F	G	F	F-G	E	E	E	—	G	G	G	F	—	G	G	G	G	E	—	—	E	—	G	E	G	G	G	G	G
Buttonweed, Virginia	P	—	F	—	F	P-F	F	F	E-F	E-F	F	G	F	F	—	G	G	—	—	—	G	—	—	G	F	F-P	G	G	G	—	G	
Carpetweed	SA	G	—	E	G	F	E	E	E	E	G	G	—	—	—	—	G	—	—	G	P	G	—	E	—	G	—	G	G	G	G	G
Carrot, wild	A,B	—	—	—	G	F	E	G	P-F	E	—	G	G	—	—	—	G	—	—	—	E	—	—	E	G	F	—	G	G	—	G	
Chamberbitter	SA,P	—	G	G-E	P	—	—	—	—	—	—	—	—	—	—	—	—	P	—	—	E	—	—	—	—	E	—	—	—	—	—	
Chickweed, common	WA	G	G	E	P	G	G	E	E	E	F	G	G	—	G	G	G	G	G	G	E	G	—	E	—	E	—	E	E	G	G	G
Chickweed, mouse-ear	WA,P	G	F-G	F-G	G	G	G	E	E	E	F	G	G	P	G	G	G	G	—	G	E	G	—	G	P-F	E-F	E	E	G	G	G	
Chicory	P	—	—	—	G	E	G	E	E	E	—	G	—	—	—	—	G	—	—	—	E	—	—	G	G	G	—	G	—	G	—	G
Cinquefoil, common	P	—	E	—	E-F	E-F	E-F	E-F	E-F	E-F	—	G	F	—	—	—	G	—	—	—	—	—	—	G	—	—	—	—	—	G	G	G
Clover, crimson	SA	—	—	—	G	G	E	E	E	E	—	G	G	G	—	—	G	—	—	—	—	—	E	E	—	—	—	E	G	—	G	
Clover, hop	WA	G	E	E	F-G	G	G	E	E	E	—	G	G	G	G	—	G	—	—	—	F	—	E	E	—	E	—	E	G	—	G	
Clover, white	P	—	E	E	F-G	G	G	E	E	E	—	G	G	G	—	G	G	G	G	G	E	G	E	G	F-G	E-F	E	E	G	G	G	
Cudweed	WA	G	E	G-E	G-E	—	E	G-E	G-E	E	—	—	—	G	—	G	G	G	G	—	E	—	—	E	—	G-E	G-E	G	G	G	G	
Daisy, English	P	—	—	—	P	F	G	G	F	E	—	G	—	F	—	—	G	—	—	—	—	—	F	F-G	—	—	G	G	F-G	—	G	
Daisy, oxeye	P,B	—	—	—	F	F	F	F	F	E-F	—	—	—	—	—	—	G	F	G	—	—	—	—	G	—	—	—	—	G	—	G	
Dandelion	P	G	G	E-F	G	G	G	E	E	E	—	G	G	F-G	—	F-G	G	P-F	G	G	E	G	F-G	G	G	F-E	G	G	G	G	G	
Dandelion, Catsear	P	—	G	—	E-F	F	E	E	E	E	—	—	—	—	—	—	G	—	G	—	—	—	—	G	—	G	E	E	—	—	G	
Dayflower, Spreading	SA	—	—	G-E	F	F	F	F-G	F-G	F-G	—	G	—	—	—	—	G	—	—	—	G	—	P	E	—	F-G	—	—	G	—	G	
Deadnettle, purple	WA	—	—	G-E	G	F	G	F	—	F-G	—	G	—	—	G	E	G	—	—	—	P	—	G	E	—	—	F	—	—	G	—	G
Dichondra	P	—	G	E-F	E	F	E-F	E	E	E	—	—	—	—	—	—	—	G	—	—	P	—	E	—	—	—	E	—	—	—	—	
Dock, broadleaf & curly	P	—	E	F	G	F-G	F-G	G	F-G	E-F	—	G	G	G	—	—	G	—	—	G	G-E	G	—	G	F-G	G	E	—	G	G	G	
Dogfennel	P	—	G	—	G	—	G	—	—	E	—	G	—	—	—	—	G	—	G	—	—	—	E	—	E	E	—	G	—	G		
Doveweed	SA	—	—	G-E	F	F	F	F-G	F-G	F-G	—	—	—	—	—	—	—	G	—	—	P-F	—	—	—	—	F-G	—	G	—	—	—	
Eveningprimrose, Cutleaf	WA	—	—	E	—	—	G	G	F	G	—	—	—	—	G	—	G	G	—	—	—	G	—	—	G	G	G	G	—	G	—	
Falsedandelion, Carolina	WA,B	—	—	P	G	G	G	—	G	—	—	—	G	G	—	G	—	—	—	—	G-E	—	—	E	P	—	G	—	—	—	—	
Filaree, redstem	WA	—	—	—	P-F	—	G	—	—	—	—	G	G	—	G	—	G	—	—	—	—	—	—	E	—	—	—	—	G	G	G	
Garlic, wild	P	—	—	P	G	P	—	E-F	E-F	E-F	—	G	F	—	—	—	G	G	—	—	G-E	—	P	G	—	G	—	—	G	G	G	
Geranium, Carolina	WA	—	E	E	E-F	E	E	E	E	E	—	G	F	—	G	—	G	G	—	—	P-F	—	—	E	—	—	—	G	G	G	G	
Groundsel	WA	—	—	—	G	G	—	G	G	G	—	G	G	G	—	—	—	—	—	—	E	—	—	E	—	G	—	—	G	—	—	
Hawkweed	P	—	—	—	G	P	G	E-F	E-F	E-F	—	G	—	—	—	—	G	—	—	—	—	—	—	G	—	—	G	G	G	—	G	
Healall	P	—	G	—	G	P	E-F	E	E	E	—	G	—	P	—	—	G	—	—	—	G	—	—	G	P	—	E	E	G	—	G	
Henbit	WA	G	G	E	F-G	F	G-E	F	E-F	E	F	G	G	—	G	F-G	G	G	G	G	E-F	G	—	E	—	E	G	G	G	G	G	G

Weed	Lifecycle	Amicarbazone	Aminocyclopyrachlor	Atrazine/Simazine	2,4-D	MCPP	Dicamba	2,4-D + MCPP	2,4-D + 2,4-DP	2,4-D + MCPP + dicamba	Carfentrazone	Carfentrazone + 2,4-D + MCPP + MCPA &/or dicamba	Chlorsulfuron	Clopyralid	Flumioxazin	Fluroxypyr	Fluroxypyr + 2,4-D + dicamba	Imazaquin	Iodosulfuron-dicamba + thiencarbazone	Mesotrione	Metsulfuron	Pyraflufen-ethyl	Quinclorac	Quinclorac + 2,4-D + sulfentrazone + dicamba	Triclopyr	2,4-D + triclopyr	Triclopyr + clopyralid	MCPA + triclopyr + clopyralid	Sulfentrazone + 2,4-D + MCPP + dicamba	Sulfentrazone	Triclopyr + dicamba + sulfentrazone + 2,4-D
Horseweed	WA,SA	—	—	E	F	—	E	—	—	G-E	—	—	G	—	—	G	—	—	G	—	G	—	F-G	—	—	E	E	—	—	—	—
Ivy, ground	P	—	E	—	F-G	G	F-G	G	F-E	E-F	F	G	—	—	—	G	G	—	G	G	G	—	—	G	G	F	G	G	G	G	G
Knawel	WA	—	G	—	P	F	E	E-F	E-F	E	—	—	—	G	—	G	G	G	—	—	—	—	—	—	—	G	—	G	—	—	—
Knotweed, prostrate	SA	—	—	E	F	F	G	G	G	F-G	—	G	G	—	—	F-G	G	—	—	—	F	G	—	E	—	G	G	G	G	G	G
Kochia	SA	—	—	—	G	—	G	G	F	G	F	—	—	—	—	G	—	—	—	G	G	—	—	—	—	G	—	G	—	G	—
Lambsquarters	SA	—	—	G	G	G	G	F	F	G	—	G	G	—	—	—	G	—	G	—	G	G	—	E	G	G	F	G	G	G	G
Lespedeza, annual	SA	—	E	E	F-P	E	E	E-F	F	E	—	G	—	G	—	—	G	—	G	—	E	—	—	E	G	G	E	E	G	G	G
Mallow	P	—	—	—	F-G	F	G	E-F	E-F	E-F	G	G	G	—	—	—	G	—	—	—	G	—	—	G	—	G	G	G	G	G	G
Medic, black	A	—	E	—	P	F	G	G	E	E	G	G	—	G	—	G	G	G	—	—	—	—	E	E	G	G	E	G	G	G	G
Moneywort	P	—	—	—	G	—	—	G	G	G	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	G	G	—	—	—	—
Mugwort	P	—	—	—	F	F-P	G-E	F	F	F	—	—	—	F-G	—	—	G	—	—	—	—	—	—	—	P-F	—	—	—	—	—	—
Mustard, wild	WA	—	—	E	G	F	G	E	E-F	E	—	G	G	—	G	—	G	—	G	—	G	G	—	E	G	G	—	G	G	—	G
Nettle, stinging	P	—	—	F-G	G	—	F	F	F	F	—	—	—	—	—	—	G	—	—	—	—	G	—	—	—	F	—	G	—	G	
Onion, wild	P	—	—	P	G	P	F	G	F	E	—	G	F	—	—	—	G	G	—	—	G-E	—	—	G	—	—	—	—	G	G	G
Parsley-piert	WA	—	—	E	P	E-F	E-F	E-F	P	E-F	—	G	—	—	G	—	G	G	—	—	G-E	—	—	E	—	E	—	—	G	G	G
Pearlwort	WA	—	—	—	E-F	E-F	—	E-F	E-F	E-F	—	—	—	—	G	—	G	—	—	—	—	—	—	—	F	—	—	—	—	—	—
Pennywort (dollarweed)	P	—	G-E	E	G	G	E-F	E-F	E-F	E-F	F	G	—	G	—	—	G	F-G	—	—	G	—	E	G	F	—	E	E	—	—	—
Pepperweed, Virginia	WA	—	—	E	G	E-F	G	E-F	E	E	—	G	—	—	G	—	G	—	—	—	—	—	—	E	E	E	G	G	G	—	G
Pigweed	SA	—	—	G	G	G	E-	G	E	G	G	G	—	—	—	G	—	G	G	—	G-E	G	—	E	F-G	—	—	—	E	G	G
Pineapple-weed	WA,SA	—	—	—	F	F	—	F	F	F	—	G	G	G	—	—	—	G	—	G	—	G	—	E	—	F	—	—	G	G	G
Plantains	P	—	G	F-P	G	G	G	E	E	E	—	G	F	G	—	F-G	—	—	G	—	G-F	—	—	G	F-G	F-G	E	E	G	G	G
Purslane, common	SA	G	G	G	G	F	G	G	G	E-F	—	G	G	—	—	E	—	—	—	—	G	G	—	E	G	—	—	G	G	G	G
Pusley, Florida	SA	—	F-G	—	G	—	G	—	F	G	—	G	—	G	—	—	—	—	—	G	G	—	—	E	—	G	—	G	G	G	G
Ragweed, common	SA	—	—	G	G	G	G	G	F	G	—	G	G	G	—	—	G	G	G	—	G	G	—	E	G	G	F	G	G	G	G
Rocket, yellow	WA,B	—	—	—	F-G	F-G	F	G	G	G	—	G	G	—	G	—	G	—	—	—	P	G	—	E	—	G	—	G	—	—	G
Shepherd's-purse	WA	—	—	—	G	E-F	G	E-F	E-F	E	G	G	G	F	G	—	G	—	—	—	G	G	—	E	—	—	G	G	G	—	G
Sida spp.	A	—	—	—	—	—	—	—	—	F-G	—	—	—	—	—	—	G	—	—	—	G	—	—	—	—	—	—	G	—	—	—
Smartweed	SA	—	—	G	G	—	G	—	G	G	G	G	G	G	—	—	G	G	—	—	F-G	G	—	—	G	G	F-G	G	G	G	G
Sorrel, red	P	—	—	—	G	E	G	G	F	G	F	G	—	G	—	—	G	G	—	—	G	—	—	G	F-G	—	E	G	G	G	G
Speedwell, common	P	—	—	F	F	F	P	G	G	G	—	—	G	G	—	—	G	F	—	G	—	—	E	F-G	F-G	G	F-G	G	—	G	G
Speedwell, corn	WA	G	F-G	E	F-P	F	F-P	G	F-G	G	—	—	G	G	—	—	G	—	G	G	G-E	—	—	G	F-G	G	F-G	G	F-G	G	—
Speedwell, germander	P	—	—	F	P	F	P	G	G	G	—	—	G	—	—	—	—	—	—	—	—	—	—	F-G	F-G	G	F-G	G	—	G	—
Speedwell, purslane	WA	—	—	F	—	F	—	G	G	G	—	—	—	G	G	—	G	—	—	—	—	—	—	G	F-G	-G	F-G	G	—	G	—
Speedwell, thymeleaf	P	—	—	F	P-F	F	P	F	G	G	—	—	G	—	—	—	—	—	—	—	—	—	E	F-G	F-G	G	F-G	G	—	G	—
Spurge, prostrate	SA	—	—	E-F	F	G	G	G	F	G	F	G	—	—	—	—	G	—	G	—	E	G	G	E	F-G	E-F	E-F	G	G	G	G
Spurge, spotted	SA	—	F-G	E	F-P	G	G	G	F	G	F	G	—	—	—	—	G	—	G	—	E	G	G	E	F-G	F	E-F	G	G	G	G
Spurry, corn	P	—	—	—	F	—	F-G	F	F	G	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	F	F	—	—	—	—
Spurweed (lawn burweed)	WA	G	G	F-G	F	E-F	E	E-F	F-G	E	F	—	—	—	G	—	G	—	—	G	G-E	—	—	E	F-G	E	E	G	—	G	—
Strawberry, Indian mock	P	—	—	—	P	F	E-F	F	P	E-F	—	—	—	—	—	—	G	—	—	—	—	—	—	G	—	—	—	—	G	—	G
Thistles	B,P	—	G	P	G	G	G	E-F	E-F	E	F	G	F	G	—	—	G	G	G	G	P-F	—	—	E	G	—	G	G	G	—	G

Weed	Lifecycle	Amicarbazone	Aminocyclopyrachlor	Atrazine/Simazine	2,4-D	MCPP	Dicamba	2,4-D + MCPP	2,4-D + 2,4-DP	2,4-D + MCPP + dicamba	Carfentrazone	Carfentrazone + 2,4-D + MCPP + MCPA &/or dicamba	Chlorsulfuron	Clopyralid	Flumioxazin	Fluroxypyr	Fluroxypyr + 2,4-D + dicamba	Imazaquin	Iodosulfuron-dicamba + thiencarbazone	Mesotrione	Metsulfuron	Pyraflufen-ethyl	Quinclorac	Quinclorac + 2,4-D + sulfentrazone + dicamba	Triclopyr	2,4-D + triclopyr	Triclopyr + clopyralid	MCPA + triclopyr + clopyralid	Sulfentrazone + 2,4-D + MCPP + dicamba	Sulfentrazone	Triclopyr + dicamba + sulfentrazone + 2,4-D
Vetch, common	WA, SA	—	E	E	G	G	G	G	F	G	—	—	—	G	G	—	G	G	—	—	E	—	G	G	G	G	E	G	—	—	—
Violet, Johnny-jumpup	WA	—	—	—	F-P	F-P	E-F	F-P	F	F-P	—	—	—	—	G	—	—	P-F	—	G	E	—	G	F	—	F-G	F-G	—	—	—	
Violet, wild	P	—	G	—	F-P	F-P	E-F	F-P	F	F-P	—	G	F	—	—	—	—	—	—	G	—	—	F-G	F	F	F-G	F-G	F-G	F-G	G	G
Woodsorrel, creeping	P	—	—	F	P	P	G	P-F	P-F	P-F	—	G	—	—	—	G	—	—	—	G	F-G	—	G	F-G	F-G	F	—	—	G	G	
Woodsorrel, yellow	P	—	—	F-G	P	P	G	F-P	F-P	F-P	—	G	—	P	—	G	—	—	G	E-F	—	—	G	F-G	—	E-F	—	—	G	G	
Yarrow	P	—	—	—	F	F	E	G	G	E-F	—	G	G	—	—	G	—	—	—	G	F-G	—	G	F-G	G	—	G	G	—	G	

¹A = annual, B = biennial; P = perennial; SA = summer annual; WA = winter annual. ²E = excellent (>89%) control; F = Fair to Good (70 to 89%), good control sometimes with high rates, however a repeat treatment 1 to 3 weeks later each at the standard or reduced rate is usually more effective, especially on perennial weeds; P = poor (<70%) control in most cases. Not all weeds have been tested for susceptibility to each herbicide listed.

POSTEMERGENCE HERBICIDES (Refer to Herbicide Label for Specific Turf Species Use Listing)¹

COMMON NAME (lbs ai/acre)	TRADE NAME (product rate/acre)	WEEDS CONTROLLED	TURFGRASS USE	COMMENTS
Amicarbazone (0.044 to 0.175)	Xonerate 70WDG (1 to 4 oz)	Annual bluegrass, some broadleaf weeds (refer to the label), blanket crabgrass	All warm-season turfgrasses. Most cool-season turfgrasses established for at least 6 months.	For selective <i>Poa annua</i> control in creeping bentgrass, up to 4 applications spaced 7 days apart at 1 oz/acre each are used starting in late winter 2 to 4 following active <i>Poa</i> growth when temperatures are between 50 & 75F. On overseeded ryegrass, apply once regrowth resumes in late winter at 2 to 4 oz/acre. Repeat in 2 to 3 weeks. Repeat applications should be perpendicular to the initial, minimizing overlaps in at least 20 GPA. Adding a NIS is optional. Bentgrass areas can be reseeded 7 days following the last application. Treat only when temperatures are between 50 and 80 F. Three to 5 oz/acre may be used in St. Augustinegrass for blanket crabgrass control. Maximum use rate per season is 10 total oz/acre. Do not use mefluidide before or tank-mixed with amicarbazone. Read label closely before using on tall fescue or Ky. bluegrass. Triazolone herbicide.
2,4-D Amine (½ to 1 lb) See product label.	Several Brands	Many broadleaf weeds including matchweed, dandelion, pennywort, (dollarweed), wild garlic/onion, clover, chickweed, pearlwort, plantains, buttonweed. 2,4-DB alone will not adequately control leguminous weeds.	Bahiagrass Bermudagrass Kentucky bluegrass Ryegrass Tall fescue Zoysiagrass	Apply when weeds are young and actively growing. Repeat application in 10 to 14 days may be necessary for complete control. Use lower rates (0.5 lb ai/A) on 'Tifgreen' and 'Tifdwarf' Bermudagrass. Amine formulations should be used near ornamentals as volatile ester formulations have drift and volatility problems. Use low rate on centipedegrass, bluegrass, fescue, and carpetgrass. Not recommended on St. Augustinegrass. For hard-to-control perennial broadleaf weeds like buttonweed, white clover, henbit, and chickweed, formulations containing dicamba and a wetting agent will increase control. Repeat in 3 to 6 weeks. Low volatile ester formulations at the high rate are best for wild garlic/onion control. For this, apply in December and early March. Repeat in 3 weeks. Phenoxy herbicides.
2,4-D + 2,4-DP (0.7 to 0.9 each) See product label.	Weedone DPC (3 to 4 pts)			
dicamba (⅔ to ½ lbs) See product label.	Vanquish 4S (¼ to 1 pts) plus others	White clover, spurge, woodsorrel, dichondra, wild onions, henbit, knotweed, lespezeza, docks, + others		Avoid drift. Often effective on weeds not controlled by 2,4-D such as henbit, knotweed, clovers, lespezeza, docks, and woodsorrel, therefore, is used in many 2- and 3-way mixtures. Do not apply within the root zone of ornamentals as dicamba may leach and damage desirable plants. Repeat applications 10 to 14 days apart may be needed for complete control but may also result in some turf injury. Check label for use on greens; may be used on bentgrass tees & fairways. Use low rate on cool-season grasses. Benzoic acid herbicide.
dicamba (⅔ lbs) + 2,4-D, MCPP, MCPA, 2,4-DP (½ to ¾ lbs) &/or clopyralid, triclopyr, fluroxypyr, quinclorac, carfentrazone, sulfentrazone, pyraflufen	Many brands contain these mixtures. See product label for specific rates.	Same as for dicamba, also matchweed, clover, spurge, pennywort and others.		Same as for dicamba. Refer to product label for rates as herbicide ratios vary between brands. Use only on actively growing, non-stressed turf. Use low rates on cool-season grasses. Check label for use on golf greens. Mecomec 4 (¾ fl oz/1000 sq.ft.) and MCPP-4 amine (¾ fl oz/1000 sq.ft.) are MCPP formulations labeled for greens. Triplet (¾ fl oz/1000 sq.ft.), Bentgrass Selective (1 fl oz/1000 sq.ft.), and Trimec Bentgrass (1 fl oz/1000 sq.ft.) are MCPP + 2,4-D + dicamba formulations for greens, yellowing may occur.

POSTEMERGENCE HERBICIDES (*Refer to Herbicide Label for Specific Turf Species Use Listing*)¹

COMMON NAME (lbs ai/acre)	TRADE NAME (product rate/acre)	WEEDS CONTROLLED	TURFGRASS USE	COMMENTS
carfentrazone (0.0022 to 0.031 lbs)	QuickSilver 1.9 EC (0.55 to 2.1 fl oz)	Broadleaf weeds such as chickweed, white clover, dandelion, spurge, corn speedwell and plantain		Weed control is best when applied to small actively growing weeds (1-4 inches in height). This product is a contact herbicide with little to no residual activity. Can be used on centipedegrass and St. Augustinegrass (use low rate). For more advanced weeds and broader weed spectrum, this product can be tank mixed with 2,4-D, dichloprop, dicamba, MCPP, MCPA and atrazine. Use rates less than 1 fl oz/a when in combination with other herbicides. Maximum rate is 2.1 fl oz/a and a maximum of 3 broadcast applications per year per application site. Do not apply to hybrid bermudagrass or carpetgrass.
clopyralid (0.09 to 0.5 lbs)	Lontrel T&O 3L (¼ to 1.33 pts)	Broadleaf weeds, especially legumes such as clovers, vetch, and medic. Also for dock, speedwell, ragweed, and plantain.		Contains no 2,4-D. Safe on all warm- and cool-season turfgrasses but use high rates only on cool-season turfgrasses. Available for bentgrass fairways. Expect short-term phytotoxicity to warm-season grasses. Aster & legumes are especially susceptible. Not labeled for golf greens or tees or for residential turf. Do not use treated clippings for mulching and compost. Use only on grass mowed >½-inch. Picolinic acid herbicides.
clopyralid + triclopyr (0.09-0.19 + 0.28-0.56)	Confront 3L (1 to 2 pts)			
fluroxypyr (0.125 to 0.5 lbs)	Spotlight 1.5L (0.66 to 2.66 pts)	Broadleaf weeds such as white/hop clover, ground ivy, chickweed, henbit, dandelion, plantain, purple deadnettle, woodsorrel, annual lespedeza and other broadleaf weeds		Weed control spectrum increases when tank-mixed with 2,4-D, MCPP, triclopyr, &/or dicamba. Note label rate restrictions for use on bentgrass, St. Augustinegrass, zoysiagrass and centipedegrass. Safe on most warm- and cool-season turfgrasses. Not labeled for golf greens or tees. Avoid treating to exposed suckers or exposed roots of trees and ornamentals. Do not use on newly seeded turfgrasses until they have been mowed at least twice. Pyridine herbicide. Bastion T, Battleship III, Chaser Ultra 2 Selective Herbicide, Escalade 4.4L and Escalade Low Odor 4.4L are pre-tank mixtures of fluroxypyr plus 2,4-D, 2,4-DP, MCPP, MCPA, triclopyr &/or dicamba.
fluroxypyr + triclopyr (0.5 to 1.0 lb)	Tailspin 1.33L (3 to 6 pts)	Numerous broadleaf weeds such as black medic, clover, woodsorrel, Vetch spp. plantain, Buttonweed, Veronica spp.	Cool-season turfgrasses only	See comments for fluroxypyr and triclopyr. Not for use on greens or tees. Controls many tough broadleaf weeds. Some injury to bentgrass may occur.
iodosulfuron + dicamba + thiencazone (0.11 to 0.21 lbs)	Celsius 68WDG (2.5 to 4.9 oz)	Broadleaf weeds like medic, geranium, clover, speedwell, dandelion, dollarweed, doveweed, burweed, spurge, others + carpetgrass.	Bermudagrass, Buffalograss, Centipedegrass, St. Augustinegrass, Zoysiagrass	Maximum yearly use rate of 7.4 oz/acre. Not for golf greens or collars or non-established turf. Do not use on desirable bahiagrass or cool-season turfgrasses. Do not use within 14 days of overseeding with ryegrass or sprigging with bermudagrass, or 30 days prior to seeding bermuda or zoysiagrass. For dallisgrass suppression, tank-mix (up to 0.11 oz) with foramsulfuron (Revolver 0.19L) at 2 fl oz per gallon water. Spot treat in late summer, repeat in 14 days.
foramsulfuron + halosulfuron + thiencazone-methyl (0.038 to 0.121 lb)	Tribute Total 61WDG (1 to 3.2 oz)	Early crabgrass, goosegrass plus many annual broadleaf weeds, sedges/kyllinga, ryegrass, fescue clumps, dallisgrass suppression,	Bermudagrass Zoysiagrass	For dallisgrass suppression, late summer (Sept. Oct.) treatments are best. Two applications at the high rate, 30 days apart are needed. Repeat for at least 1 additional year. Good soil moisture at the time of treatment is needed. Add MSO or NIS at 0.25% v/v. Sulfonyleurea, sulfonylaminocarbonyl triazolinone.

POSTEMERGENCE HERBICIDES (*Refer to Herbicide Label for Specific Turf Species Use Listing*)¹

COMMON NAME (lbs ai/acre)	TRADE NAME (product rate/acre)	WEEDS CONTROLLED	TURFGRASS USE	COMMENTS
flumioxazin (0.375 lbs)	SureGuard 51WDG (12 oz/acre)	Winter annual broadleaf weeds, preemergence crabgrass	Dormant bermudagrass	A contact product for dormant bermudagrass for rapid nonselective winter annual broadleaf control with subsequent preemergence crabgrass control. Best winter annual broadleaf control is with early winter (Nov. & Dec.) applications. Best preemergence crabgrass control are with late winter applications. Allow 8 weeks after application before seeding or sodding. BroadStar 0.25G is a granular formulation. Dicarboximide herbicide.
penoxsulam (0.01 to 0.06 lbs)	LockUp + others	Broadleaf weeds including FL Betony, ground ivy, chickweed, oxalis, bittercress, pigweed, killings, broadleaf plantain,	most warm- & cool-season grasses except bahiagrass, fairways & roughs only	A granular postemergence broadleaf herbicides that will be custom blended by distributors. Depending on the formulation, the medium rate will be 0.03 lbs ai/acre applied twice, 4 weeks apart. Will be mixed with dicamba or 2,4-D + dicamba. Sapphire will be a liquid formulation of penoxsulam available only in the Western USA specifically for English daisy control.
pyraflufen-ethyl (0.00097 to 0.0055 lbs)	Octane 0.177L (0.7 to 4 oz)	Broadleaf weeds including dandelion, henbit, chickweed, clovers, knotweed, spurges, wild garlic and many others. Often an additive with other broadleaf herbicides to provide broader weed control spectrum and to hasten results.	Bentgrass Bermudagrass Centipedegrass Fine Fescue Kentucky bluegrass Ryegrass Tall Fescue Zoysiagrass	Safe on most warm- and cool-season turfgrasses. Use rate is 0.7 to 2.5 fl.oz./acre when in tank mix combinations with other broadleaf herbicides; 1 to 4 fl oz per acre if used alone. Weed control spectrum increases when tank-mixed with 2,4-D, dicamba, MCPA, triclopyr, fluroxypyr, and various combination of these. Do not apply to golf course tees or greens or to desirable carpetgrass or clovers. Do not use on newly seeded turfgrasses until they are established. Treated areas may be seeded or overseeded 1 day following application. Avoid drift onto ornamentals, trees, and shrubs. Professional use only.
sulfentrazone (0.125 to 0.375)	Dismiss 4F, Spartan 4F (1/4 to 3/4 pts)	Broadleaf weeds including dandelion, henbit, clovers, chickweed, spurges, speedwells, wild garlic and many others. Also suppresses and controls annual sedges, purple and yellow nutsedge and kyllingas	Bahiagrass Bentgrass Bermudagrass Buffalograss Carpetgrass Centipedegrass Fine Fescue Kentucky bluegrass Ryegrass Seashore Paspalum Tall Fescue Zoysiagrass	Safe on most warm- and cool-season turfgrasses. Maximum use rate on bentgrass, perennial ryegrass, fine and tall fescue is 4 fl oz/acre. Weed control spectrum increases when tank-mixed with 2,4-D and dicamba. Do not apply to golf course tees or greens. Do not apply directly to landscape ornamental or ornamental beds. Do not apply with surfactants unless compatibility test have been previously demonstrated as compatible and safe on grass type. Reseeding, overseeding, and sprigging can be performed three months after application due to product inhibiting establishment. Overseeding with ryegrass needs to be delayed 4 to 6 weeks after application but only if slight injury can be tolerated. Do not use on newly seeded turfgrasses until they have been mowed at least twice. Recommended that sod be established for at least 6 weeks before application and not within 3 months of a harvest. Spartan 4F is intended for sod and seed farms. Surge 2.18L is a pre-tank mixture of sulfentrazone plus 2,4-D, MCPA and dicamba. Echelon 4SC is a pre-tank mix of sulfentrazone + prodiamine. Dismiss South provides similar weed control as Dismiss with the addition of purple nutsedge.
sulfentrazone + imazethapyr (0.29 to 0.45 lbs)	Dismiss South 4F (9.5 to 14.4 oz)			

POSTEMERGENCE HERBICIDES (Refer to Herbicide Label for Specific Turf Species Use Listing)¹

COMMON NAME (lbs ai/acre)	TRADE NAME (product rate/acre)	WEEDS CONTROLLED	TURFGRASS USE	COMMENTS
sulfentrazone + quinclorac (0.75 to 1.5)	Solitaire 75WG (1 to 2 lb)	Numerous broadleaf weeds, yellow nusedge, crabgrass, & foxtail. Refer to label for complete listing.	Bermudagrass, Bluegrass, Buffalograss, Centipedegrass, Perennial ryegrass, Seashore paspalum, Tall fescue, Zoysiagrass	Refer to comments for sulfentrazone and quinclorac. Not for use on golf greens, collars, or tees. A one month seeding restriction follows use. High rate is for warm-season turfgrasses.
carfentrazone + quinclorac (0.35 to 0.79)	Square One 70WDG (8 to 18 oz)	Numerous broadleaf weeds, yellow nusedge, crabgrass, & foxtail. Refer to label for complete listing.	All cool- and warm-season turfgrasses except St. Augustinegrass	Refer to comments for carfentrazone and quinclorac. Not for use on golf greens, collars, or tees. Can be used 1 day prior to or 7 days following seeding. High rates are for warm-season turfgrasses.
sulfentrazone + metsulfuron (0.134 to 0.413)	Blindside 66WG (3.25 to 10 oz)	Numerous broadleaf weeds esp. dollarweed, ground ivy, doveweed, wilt violet and some sedges (not Purple). Refer to label for complete listing.	Bermuda, Centipedegrass, Ky. bluegrass, St. Augustinegrass, Tall fescue, Zoysiagrass	Refer to comments for sulfentrazone and metsulfuron. Not for use on golf greens, collars, or tees. A one month seeding restriction follows use. Rate range for cool-season grasses is 3.25 to 6.5 oz product per acre and 6.5 to 10 oz per acre for warm-season grasses.
triclopyr alone, (½ to 1 lb)	Turflon Ester 4L (1 to 2 pts)	Broadleaf weeds; partial bermudagrass & kikuyugrass suppression	Bahiagrass Bermudagrass Kentucky bluegrass	Use high rates only on cool-season turfgrasses. Even at low rates, expect short-term phytotoxicity to warm-season grasses. Repeat applications spaced 4 weeks apart are necessary for hard-to-control broadleaf weeds such as speedwell, parsley piert, violets, ground ivy, and woodsorrel. Newly established turf should be mowed 3 times before application. Picolinic acid herbicide.
triclopyr +2,4-D (¼ to ½) + (½ to 1 lb)	Turflon II Amine (1 to 2 qts) Chaser 3L (1 to 2 qts)		Ryegrass Tall fescue Zoysiagrass	
MSMA/DSMA/CMA (1.0 to 2.0 lbs)	Several brands and formulations	Crabgrass, crowfootgrass, bahiagrass, nutsedge, dallisgrass, thin paspalum, alexandergrass, sandspur, annual broadleaf weeds	Bermudagrass	Repeat (2 to 4) applications at 7-10 day intervals are necessary, especially as weeds mature. Turf discoloration may occur, especially on `Tifdwarf' and `Tifgreen.' Use reduced rates on these cultivars. Apply when soil moisture is adequate. A nonionic surfactant is necessary but read the label for specific instructions regarding this. Multiple applications 5 to 7 days apart are required for dallisgrass and bahiagrass control. Do not use on desirable St. Augustinegrass, centipedegrass or bahiagrass. Use low rates on zoysiagrass. Of the three, CMA causes less discoloration to turfgrasses and should be the product of choice on cool-season grasses such as Ky. bluegrass, bentgrass fairways, and tall fescue. Organic arsenical herbicides. NOTE: The USEPA has cancelled all arsenical herbicides, effective in 2013.

POSTEMERGENCE HERBICIDES (Refer to Herbicide Label for Specific Turf Species Use Listing)¹

COMMON NAME (lbs ai/acre)	TRADE NAME (product rate/acre)	WEEDS CONTROLLED	TURFGRASS USE	COMMENTS
MSMA (1.0 lbs) + metribuzin ($\frac{3}{8}$ to $\frac{1}{4}$ lbs)	Several brands + Sencor 75DF (0.16 to 0.33 lbs)	Crabgrass, goosegrass, dallisgrass, nutsedge, thin paspalum		The tank mix provides better goosegrass control than MSMA alone. Do not apply to turf under stress. Do not apply to tees, greens, or closely mowed turf. Do not add surfactant with this combination. Do not apply within the root zone of shallow rooted ornamentals. Some degree of short-term phytotoxicity can be expected, especially when applied during hot temperatures. Two applications 7 to 10 days apart may be necessary, especially with mature weeds. NOTE: The USEPA has cancelled all arsenical herbicides, effective in 2013.
MSMA (1.0 lbs) + foramsulfuron (0.039 lbs)	Several brands + Revolver 0.19L (27 oz)	Dallisgrass		Two strategies are used. One is to tank mix MSMA + Revolver at the indicated rates and apply twice, 10 days apart. The other is to alternate MSMA followed by Revolver 7 days later and then MSMA 7 days after the Revolver treatment. NOTE: The USEPA has cancelled all arsenical herbicides, effective in 2013.
metribuzin ($\frac{1}{4}$ to $\frac{1}{2}$ lb)	Sencor 75DF (0.33 to 0.66 lb)	Goosegrass, annual broadleaf weeds		Same as for MSMA + metribuzin above. Use higher rate on dormant bermudagrass for winter annual weed control. Use low rate on actively growing bermudagrass. Triazine herbicide.
diclofop-methyl ($\frac{3}{4}$ to 1 lbs)	Illoxan 3EC (1 to 1.4 qts)	Goosegrass, ryegrass		For use only on golf courses. Young goosegrass plants are easiest to control. The high rate is needed for older plants. Larger, mature goosegrass will not be adequately controlled. Do not mow 24-36 hours after applying. Control takes 2-3 weeks. May cause temporary (7 to 10 days) phytotoxicity. Treat only well established and actively growing turf. Wait 6 weeks before overseeding after the last application. Tank mixing with MSMA, 2,4-D, or metribuzin increases turf burn and may reduce weed control. Restricted Use Pesticide. Aryl-oxy phenoxy herbicide.
ethofumesate (1 to $1\frac{1}{2}$ lb)	Prograss 1.5 EC (2.66 to 4 qt) Prograss 4 SC (2 to 3 pts)	Annual bluegrass, chickweed		Provides annual bluegrass control in dormant bermudagrass overseeded with perennial ryegrass. The first application at 2.66 qts/a should be 30 to 45 days following overseeding. The second should be 21 to 28 days later. Do not apply after January 15. May cause premature dormancy if green bermudagrass is treated. Not labeled for golf greens. May injure poorly rooted, shaded or wet bentgrass fairways sites. Unclassified herbicide.
pronamide (1 to $1\frac{1}{2}$ lbs) metsulfuron (0.02 lb) rimsulfuron (0.0075 to 0.03) foramsulfuron (0.013 to 0.039) trifloxysulfuron (0.005 to 0.015)	Kerb 50W (2 to 3 lbs) Manor/Blade 60 DF (1 oz) TranXit 25DG (0.5 to 2 oz) Revolver 0.19L (8.8 to 27 oz) Monument 75 WG (0.11 to 0.33 oz)	Annual bluegrass, ryegrass clumps, <i>Poa trivialis</i> , spring transition, various broadleaf weeds		Use only on bermudagrass or possibly zoysiagrass. Refer to the label for timing intervals of applications prior to overseeding. Do not apply on or up-slope to desirable bentgrass or overseeded turf as these may run. Movement is encourage when saturated soils are treated and/or heavy (>0.25 in) rainfall occurs within 48 hours of application. Time required for control increases as weeds mature, therefore apply in late fall for optimum results. For slow (3 to 6 weeks) transition, use the low rate of each herbicide listed. For quick transition (1 to 2 weeks), use TranXit, Revolver, Katana, or Monument at the high rate in mid-May. Treated plants do not show herbicide symptoms until air temperatures are consistently above 60F. Pronamide is a Restricted Use Pesticide. Amide and sulfonyleurea herbicides.

POSTEMERGENCE HERBICIDES (Refer to Herbicide Label for Specific Turf Species Use Listing)¹

COMMON NAME (lbs ai/acre)	TRADE NAME (product rate/acre)	WEEDS CONTROLLED	TURFGRASS USE	COMMENTS
flazasulfuron (0.012 to 0.047)	Katana 25DG (0.75 to 3 oz)			
rimsulfuron (0.015 to 0.0625 lbs)	TranXit GTA 25WSP (1 to 4 oz)	Annual bluegrass		Apply 7 to 10 days prior to overseeding. Also used for non-selective control of annual bluegrass and ryegrass in non-overseeded bermudagrass. Treat in fall to early winter for best results. Sulfonylurea herbicide.
simazine (1 lb)	Princep T&O 4L (1 qt)	Annual bluegrass, most winter annual broadleaf weeds		Do not exceed use rates. For winter annual weed control, apply 1 qt/A in early fall (after Oct. 15) and repeat in early winter. Do not apply on or upslope to desirable overseeded turf &/or golf greens. Do not use on bermudagrass during spring 'green-up' or summer unless temporary yellowing and stunting of bermudagrass can be tolerated. Triazine herbicide.
foramsulfuron (0.013 to 0.039)	Revolver 0.19L (8.8 to 27 oz)	All cool-season grasses including ryegrass, fescue, bluegrasses, etc., henbit, goosegrass		Controls all cool-season grasses, and for transition, plus henbit and goosegrass (at higher rates). Bermudagrass and zoysiagrass (Meyer) are tolerant. Labeled for all commercial situations such as golf courses, athletic fields, lawns, and sod farms. Refer to the label for timing intervals of applications prior to overseeding. Sulfonylurea herbicide.
bispyribac-sodium (0.022 to 0.132 lb)	Velocity 17.6SC (6 to 12 oz)	Selective Poa annual and Poa trivialis control in overseeded ryegrass and bentgrass fairways	Bermudagrass fairways overseeded with ryegrass, Bentgrass fairways	Apply between Feb. 1 and March 15 when daytime/nighttime temperatures are 70/50 F at 6 to 12 oz/acre in 25 to 50 gallons of water. Use higher labeled rates as Poa matures. Higher rates, however, may cause short-term ryegrass chlorosis. Reapply in 21 to 42 days if Poa regrowth is observed. Treated ryegrass should be overseeded before Oct. 15 th at ≥ 300 lbs seed/acre. No surfactant or adjuvants are needed. On bentgrass fairways, apply 2 to 6 oz/acre weekly in spring/summer only when the bentgrass is actively growing. For Poa trivialis control, apply 4 to 9 oz/acre weekly. For all scenarios, use lower rates when higher weed populations are present to prevent voids from developing. Pyrimidinyl benzoic acid family.
glyphosate (0.375 lbs)	Roundup Pro 4L (¾ pt)	Annual bluegrass, Winter broadleaf weeds	Dormant bermudagrass	Apply only to fully dormant bermudagrass (no green stolons or leaf tissue visible, typically January 15 to 25 in SC). Apply glyphosate in 5 to 20 GPA. Do not apply to desirable green turf. Add a nonionic surfactant to diquat and clethodim at 0.25% v/v (1 qt/100 gal). Do not apply to desirable cool-season turf species. Envoy will not control broadleaf weeds. The Envoy label is a state 24 (c) Special Local Need Label for sod production.
glyphosate + diquat (3.55 to 6.7 lbs)	QuickPRO 76 WG (4.5 to 9 oz)			
glufosinate (¾ lbs)	Finale 1SC (3 qts)			
diquat (¼ to ½ lbs)	Reward 2L (1 to 2 pts)			
clethodim (0.25 lbs)	Envoy 0.94 EC (34 oz/a)			Use QuickPRO only in areas where bermudagrass and bahiagrass are desirable ground covers. Rates greater than 9 oz/a may result in injury or delayed green-up in highly maintained areas. Apply in 10 to 80 gallons of water per acre Use lower rate for annuals and higher rate for perennials.
metribuzin (0.25 to 0.5)	Sencor 75 Turf (0.33 to 0.67 lbs)			

POSTEMERGENCE HERBICIDES (Refer to Herbicide Label for Specific Turf Species Use Listing)¹

COMMON NAME (lbs ai/acre)	TRADE NAME (product rate/acre)	WEEDS CONTROLLED	TURFGRASS USE	COMMENTS
asulam (2.0 lbs)	Asulox 3.34L (5 pts)	Crabgrass, goosegrass, sandspur	Bermudagrass, St. Augustinegrass sod production	Do not apply to freshly mowed turf or turf under stress. On Bermudagrass use on 'Tifway' only. Do not use a surfactant. Asulox is for professional applicators only and only for sod production when used on St. Augustinegrass. Carbamate herbicide.
atrazine/simazine (1 to 2 lbs)	Several Brands. Read the label for rates	Many broadleaf weeds including matchweed, oxalis, pennywort, Florida betony and some annual sedges.	Centipedegrass St. Augustinegrass Zoysiagrass	For hard to control weeds, make the first application in late fall and follow with another 4 to 6 weeks later. If weeds persist, follow atrazine applications with dicamba in 4 to 6 weeks. Some turf injury can be expected with this. Two applications of atrazine are allowed per year. Effectiveness will be reduced as weeds mature. Do not apply within the root zone of ornamentals. Triazine herbicides. Prompt 5L provides additional activity on hard-to-control weeds.
atrazine + bentazon (½ to ¾ lbs)	Prompt 5L (1.8 to 2.4 pts)			
metsulfuron (0.01 to 0.04 lb)	Manor 60DF Blade 60DF Escort 60DF (¼ to 1 oz)	Bahiagrass, foxtails, broadleaf weeds including chickweed, clover, dandelion, plantain, purslane, spurge, woodsorrel, wild onion/garlic	Bermudagrass Centipedegrass St. Augustinegrass Zoysiagrass	Note the low use rate. As weeds mature, the rate must be increased. A nonionic surfactant at 0.25 % by volume (1qt/100 gal) increases control. Do not use beneath desirable trees or ornamentals or on desirable 'Pensacola' bahiagrass. Escort is labeled for 'rough' turf such as roadsides, utility lines, and railroads while Manor and Blade are for fine turf including bermudagrass, St. Augustinegrass, zoysiagrass, centipedegrass, Ky. bluegrass and fine fescue. Do not apply to desirable tall fescue or ryegrass. Some bahiagrass varieties ('Common,' 'Argentine,' & 'Paraguayan') are not completely susceptible. Sulfonylurea herbicide.
dicamba (⅜ to ¼ lbs)	Vanquish 4S (¼ to ½ pts)	White clover, spurge, woodsorrel		Avoid drift. Do not apply within the root zone of ornamentals. Use low rates on St. Augustinegrass. Treat when temperatures are #80 F to minimize turf damage. Benzoic acid herbicide.
dicamba + 2,4-D, 2,4-DP, MCPA, and/or MCPP (⅜ + ¼ to ½ lbs)	Several brands contain these mixtures	White clover, spurge, woodsorrel, pennywort plus other broadleaf weeds.		Observe same precaution as dicamba above. Refer to product label for rates. A second application on centipedegrass 7-14 days later may be needed. Use low rates on St. Augustinegrass. A tank mix of atrazine at 1 lb ai/A + 2,4-D & dicamba at 0.2 lb ai/A each provides good control with minimum turf damage when temperatures are #80 F. Phenoxy herbicides. All 2,4-D containing formulations are limited to a maximum number of 2 broadcast applications per treatment site per year.
bromoxynil (\ to ½ lb)	Bucril 2L (1 to 2 pts)	Many young broadleaf weeds	Bentgrass Bermudagrass Ky. bluegrass St. Augustinegrass Tall fescue	Labeled only for non-residential turf, seed and sod production. Contact herbicide, therefore, thorough coverage is necessary. Safe on seedling or sprigged turf with less drift potential than phenoxy herbicides. Tank mixing with 2,4-D, dicamba, &/or MCPP will provide increased control but should be used only on established turf. May also be used on bermudagrass, bentgrass, Ky. bluegrass, tall fescue, & ryegrass but not centipedegrass. Restricted Use Pesticide. Nitrile herbicide.
sethoxydim (0.19 to 0.28 lbs)	Vantage 1L, Segment 1L (1½ to 2¼ pts)	Crabgrass, goosegrass and other annual grasses suppression of dallisgrass	Centipedegrass Fine Fescue	Apply before weeds mature. Repeat applications are necessary to suppress bermudagrass or bahiagrass. Safe on centipedegrass seedlings after the third mowing. Vantage has oil concentrate pre-added. Cyclohexendione herbicide.

POSTEMERGENCE HERBICIDES (*Refer to Herbicide Label for Specific Turf Species Use Listing*)¹

COMMON NAME (lbs ai/acre)	TRADE NAME (product rate/acre)	WEEDS CONTROLLED	TURFGRASS USE	COMMENTS
clethodim (0.125 to 0.25 lbs)	Envoy 0.94 EC (17 to 34 fl.oz.)	Common bermudagrass, other grasses such as johnsongrass, barnyardgrass	Centipedegrass Sod Production	This is a 24 (c) Special Local Need Label. Add non-ionic surfactant at 0.25% v/v (1 qt/100 gal). Apply only to actively growing, non-stressed turf. Repeat application 3 to 4 weeks apart may be necessary to suppress bermudagrass. Some discoloration to centipedegrass will occur at the higher rate. Cyclohexendione herbicide.
imazapic (0.063 to 0.125 lb)	Plateau 70 DG (1.43 to 2.86 oz or 1 to 2 water soluble packs)	Bahiagrass, crabgrass, Yellow and Purple nutsedges, annual sedge & <i>Kyllinga</i> species		For centipedegrass grown as sod, on golf courses, and other recreation areas. Not for use on home lawns. The highest rate may cause turf reddening. Repeat applications may be needed for tough to control perennial weeds such as bahiagrass. See label for mixing instructions of water soluble packs.
chlorsulfuron (0.05 to ¼ lb)	Corsair 75DF, TFC 75DF (1 to 5.3 oz)	Broadleaves, wild garlic, tall fescue, perennial ryegrass in bentgrass fairways	Bermudagrass Bahiagrass Bentgrass fairways Fine fescue Kentucky bluegrass	Especially effective for tall fescue clump control. Spot treat tall fescue & perennial ryegrass when in established Kentucky bluegrass, bentgrass fairways, or fine fescue using a hand-held sprayer delivering 1 gallon of spray solution per 1,000 sq.ft. Spray only to wet the tall fescue blades. Avoid excess-application. Repeat treatment may be needed in 60 days. Slow acting. Do not use underneath desirable shrubs or trees. Not for use in sod production. Read and follow all label directions before use. Sulfonylurea herbicide.
ethofumesate (3.0 lb)	Prograss 1.5EC (2 gal) Prograss 4SC (3 qts)	Common bermudagrass control/suppression	St. Augustinegrass	Timing is critical. Spring applications should start in the Carolinas in mid March. Repeat in 30 days. Tank mixing with atrazine or simazine at 2 lb ai/A significantly increases suppression. Temporary St. Augustinegrass stunting may result. Do not overlap. Unclassified herbicide.
fenoxaprop (0.06 to 0.17 lb)	Acclaim Extra 0.94 L (8 to 23 oz)	Annual weedy grasses, bermudagrass suppression	Annual bluegrass Bentgrass fairways Fine fescue Kentucky bluegrass Perennial Ryegrass Tall fescue Zoysiagrass	Young, actively growing weeds are easiest to control. Apply in late spring or early summer to actively growing weedy grasses. Do not apply to moisture- or heat-stressed turf or weeds. Repeat in 2 to 3 weeks for complete control. Control is reduced if applied within 14 days after a broadleaf herbicide. For bermudagrass suppression in tall fescue or zoysiagrass, begin treatment after spring green-up of the bermudagrass at 1½ pts/A and repeat at 3-week intervals. Seedlings should be at least 4 weeks old before treatment. Do not mow for 24 hrs after application, nor tank-mix with phenoxy herbicides. Not labeled for golf greens. The addition of triclopyr ester (Turflon Ester) at 1 pt/a may increase control but should not be used on warm-season grasses unless temporary phytotoxicity is acceptable. Aryl-oxy phenoxy herbicide.
fluziafop-butyl (0.05 to 0.1 lbs)	Fusilade T&O II 2EC (3 to 6 oz)	Annual grasses, bermudagrass suppression	Tall fescue Zoysiagrass	Add nonionic surfactant at 0.25% v/v. Begin treatment on zoysiagrass at 3 to 4 fl.oz./A in early June. Repeat application every 4 weeks. On tall fescue, make first application in spring after bermudagrass green-up at 5 to 6 fl.oz./A and a second application in early fall. Turf discoloration may occur for up to 14 days after application. Do not apply to tall fescue during hot, dry weather. Adding triclopyr ester (Turflon Ester) at 1 pt/a may increase control but should not be used on warm-season grasses unless temporary phytotoxicity is acceptable. Aryl-oxy phenoxy herbicide.

POSTEMERGENCE HERBICIDES (*Refer to Herbicide Label for Specific Turf Species Use Listing*)¹

COMMON NAME (lbs ai/acre)	TRADE NAME (product rate/acre)	WEEDS CONTROLLED	TURFGRASS USE	COMMENTS
quinclorac (0.75 lb)	Drive 75 DF (1 lb) Drive XLR8 1.5L (0.5 gal)	Crabgrass, signalgrass, torpedograss, barnyardgrass, foxtail, kikuyugrass, broadleaf weeds such as pennywort, speedwells, dandelion, black medic, white clover, violets	Annual bluegrass Annual ryegrass Bentgrass fairways Buffalograss Common bermuda Kentucky bluegrass Perennial ryegrass Tall fescue Zoysiagrass	At least 2 application 3 weeks apart are needed for control of perennial weeds. Multiple applications will be needed for torpedograss/kikuyugrass control. Good soil moisture should be present before treatment. Creeping bentgrass, hybrid bermudagrass, & fine fescue have intermediate tolerance. May be applied before, at , and during seedling emergence of bermudagrass, tall fescue, and zoysiagrass. Do not apply to desirable bahiagrass, centipedegrass, St. Augustinegrass, or dichondra. Tank mixing with N or Fe may lessen turf discoloration. Add a crop oil concentrate (2 pts/a) or methylated seed oil (1.5 pts/a) to increase performance but not until 28 days after seedling emergence. Not labeled for golf greens or collars. Avoid application and drift onto ornamentals. Quinolinecarboxylic Acid herbicide.
mesotrione (0.125 to 0.25 lb)	Tenacity 4L (4 to 8 oz)	Bentgrass, crabgrass, goosegrass, foxtail, nimblewill, lovegrass, barnyardgrass, yellow	Ky Bluegrass, Tall fescue, Perennial ryegrass, Centipedegrass, Fine fescue, St. Augustinegrass	For golf, sod, and commercial properties. Tenacity provides selective control of bentgrass in Ky. bluegrass and other turfgrass listed when treated twice, 3 weeks apart. Both products control nimblewill, crabgrass, goosegrass and other grasses if treated before seedhead emergence. Also used prior to seeding listed cool-season turfgrasses for preemergence crabgrass control. Use low rate on St. Augustinegrass sod. Add a nonionic surfactant at 0.25% v/v. Bentgrass, bermudagrass, zoysiagrass, Poa annua, kikuyugrass, and seashore paspalum have low tolerance. For tufted lovegrass control in zoysiagrass sod production, use 2 oz/acre Tenacity plus 0.25 lb ai/acre atrazine twice, 10 days apart. For dallisgrass, Japanese Stiltgrass, and nimblewill suppression with Pylex, apply 1 to 1.33 fl oz/acre with 3 applications 3 to 4 weeks apart. Pylex can be used on taller-mowed bentgrass at 0.5 to 1 oz/acre to control crabgrass/goosegrass and to suppress bermudagrass. Short term turfgrass phytotoxicity (whitening) may occur with either product. Mix with triclopyr ester to reduce this whitening & to increase grassy weed control. Triketone (callistemon) herbicide family.
topramezone (0.11 to 0.044 lb)	Pylex 2.8 SC (0.5 to 2.0 oz)	nutsedge, Buttercup, buckhorn plantain, carpetweed, clover, chickweed, dandelion, dock, FL betony & pusley, ground ivy, henbit, lawn burweed, oxalis, pigweed, speedwell, Canada thistle, wild violet.		
mecoprop (MCP) alone (½ to 1 lb) or plus 2,4-D and dicamba	See comment	Postemergence annual broadleaf weeds	Bentgrass	Same as for dicamba. Refer to product label for rates as herbicide ratios vary depending on brands. Use only on actively growing, non-stressed turf. Check label for use on golf greens. Mecomec 4 (¾ fl oz/1000 sq.ft.) and MCP-4 amine (¾ fl oz/1000 sq.ft.) are MCP formulations labeled for greens. Triplet (¾ fl oz/1000 sq.ft.), Bentgrass Selective (1 fl oz/1000 sq.ft.), and Trimec Bentgrass (1 fl oz/1000 sq.ft.) are MCP + 2,4-D + dicamba formulations for greens. Do not apply to stressed greens. Phenoxy herbicides.

POSTEMERGENCE HERBICIDES (Refer to Herbicide Label for Specific Turf Species Use Listing)¹

COMMON NAME (lbs ai/acre)	TRADE NAME (product rate/acre)	WEEDS CONTROLLED	TURFGRASS USE	COMMENTS
paclobutrazol (0.25 to 0.375)	Turf Enhancer 50WP (0.5 to 0.75 lb/acre or 0.28 oz/1000 ft ²) Trimmit/Turf Enhancer 2 SC (16 to 24 oz/acre or 0.55 fl.oz/1000ft ²)	<i>Poa annua</i> var. <i>reptans</i> (perennial biotype) conversion/ management in bentgrass golf greens		Root absorbed. Apply 30 days apart at higher rate 2 or 3 times in fall (September to early Dec.) plus 2 or 3 times in very early spring (late Feb. to mid April) when bentgrass is actively growing. Increased Poa control often occurs at the lower rate if a sterol inhibitor fungicide (DMI) such as Banner Maxx at 1 oz/1000 sq.ft. is applied 2 weeks following each paclobutrazol applications. Do not use if <i>Poa annua</i> populations exceed 70% as severe stand thinning or discoloration may result. Do not apply within 4 weeks of anticipated cold or hot weather. Note: This program is designed as a <u>gradual transition or conversion</u> from <i>Poa annua</i> to bentgrass. <u>Repeat applications over several years will be required.</u> Treated Poa will appear noticeably lighter green in color while treated bentgrass may appear 'grainy.' Apply only to actively growing bentgrass. Type II PGR.
trinexapac-ethyl (0.05 to 0.11)	Primo MAXX 1L (6 to 14 oz/acre or 0.14 to 0.32 fl.oz./1000ft ²)	<i>Poa annua</i> var. <i>reptans</i> (perennial biotype) conversion/ management in bentgrass golf greens		Foliar absorbed. The 6 oz/a rate is for golf greens while 11 oz/a is for fairways. A 7 oz/a rate may be used for bentgrass/ <i>Poa annua</i> mixed greens while up to 14 oz/a can be used if conversion to bentgrass is desired & temporary discoloration can be tolerated. Good golf green quality has been maintained with 2 to 6 oz/1000 ft ² every 2 to 4 weeks. Type II PGR.
siduron (11 to 22 lbs)	Tupersan 50WP (22 to 44 lbs)	Postemergence bermudagrass suppression		Granular formulations also are available. Used alone or in combination with ethofumesate (Prograss) or flurprimidol (Cutless). Control is generally best with spring (March + April + May + early June) and fall (late September + October + November) applications when the bentgrass is actively growing and the bermudagrass is not. Substituted urea herbicide.
ethofumesate + flurprimidol (see remarks)	Prograss 1.5EC + Cutless 50W (see remarks)	Postemergence bermudagrass suppression;		Apply 1 st application (March-April) when bermudagrass is breaking dormancy at 1.5 (Prograss) + 0.75 (Cutless) lb ai/A; 2 nd application 6 weeks later at 0.38 + 0.19 lb ai/a followed by 3 rd and 4 th applications spaced 3 weeks apart. Repeat applications are needed to maintain suppression. Approximately 30% bentgrass discoloration & thinning may follow high rate but should recover within 3 weeks.
carfentrazone (0.031 to 0.1)	Quicksilver 1.9 L (2.1 to 6.7 oz)	Postemergence moss suppression (<i>Bryum argenteum</i>)		Reduce surface moisture and shade as these favor moss persistence; raise the mowing height. Quicksilver at 6.7 oz/acre at 100 GPA when air temperatures are <85F provides excellent silver thread moss suppression with good bentgrass/ <i>Poa annua</i> tolerance. Do not apply to desirable hybrid bermudagrass. Repeat this every 2 weeks until complete control occurs. Other, but less effective chemical options include Daconil Weather Stik 6L at 4 to 8 oz product per 1000 sq.ft. in 5 to 10 gallons of water; Apply when temperatures are >80F (preferably, >85F); Ironizer (4-0-0-18) granular at 225 oz per 1000 sq.ft.; Iron sulfate alone at 32 oz/1000 sq.ft. or combined with ammonium sulfate at 48 oz/1000 sq.ft. Only use iron containing products when temperatures are cool. Other contact, burn-down products may also work.

POSTEMERGENCE HERBICIDES *(Refer to Herbicide Label for Specific Turf Species Use Listing)¹*

COMMON NAME (lbs ai/acre)	TRADE NAME (product rate/acre)	WEEDS CONTROLLED	TURFGRASS USE	COMMENTS
ethofumesate (0.5 to 0.75 lb)	Prograss 1.5EC (3 to 4 pts) Prograss 4SC (1 to 1.5 pts)	Annual bluegrass	Creeping bentgrass fairways & Ky. bluegrass fairways & roughs; Tall fescue	Treat young (1 to 5 leaf stage) weeds in fall. Use lower rate on closer mowed turf. Will not adequately control mature plants or perennial biotypes. Multiple applications spaced 3 weeks apart may be necessary. Do not use on turf less than 8 weeks old nor reseed within 6 weeks after application. Bentgrass that is shaded, poorly drained (wet), and cold often experience herbicide damage. Unclassified herbicide.

¹**Comments:** Active only on emerged, visible weeds. Best results occur when weeds are young. Temperatures above 85-90°F may result in phytotoxicity (yellowing) to the turf. Repeat applications may be required for acceptable control. These should be timed 10 to 14 days apart. Do not mow within 48 hrs after application for most chemicals. Most postemergence herbicides require the use of a spreader-sticker, adjuvant, crop oil, or wetting agent. Read the label before adding these as many herbicides are pre-packaged with them already added. Most postemergence herbicides need to dry on the leaf surface before irrigation or rainfall occurs.

Relative Sedge Control and Turf Tolerance to Various Herbicides (Refer to Herbicide Label for Specific Turf Species Use Listing).

Herbicide (trade names) ¹	Sedge Control					Turf Tolerance (excluding greens)									
	Annual Sedge	Purple Nutsedge	Yellow Nutsedge	Annual Kyllinga	Perennial Kyllinga	Bermudagrass	Bentgrass	Bluegrass, Ryegrass	Centipedegrass	St. Augustinegrass	Seashore Paspalum	Bahiagrass	Zoysiagrass	Kikuyurass	Tall Fescue
Preemergence Control															
Dimethenamid (Tower)	G ²	F-G	G	G	F-G	S	NR	S	NR	NR	NR	NR	S	NR	S
Metolachlor (Pennant Magnum)	G	P	G	F-G	P	S ³	NR	NR	S	S	NR	S	S	NR	NR
Oxadiazon (Ronstar 2G)	G	P	P	F	P	S	NR	S	NR	NR	NR	NR	S	NR	S
Postemergence Control															
Bentazon (Basagran T&O)	G	P	G	F-G	F-G	S	S-I	S	S	S	NR	S	S	NR	S
Imazaquin (Image)	G	G	F	G	G	I-S	NR	NR	I	I	NR	NR	S	NR	NR
Imazapic (Plateau)	G	G	G	--	--	I-S	NR	NR	S	NR	NR	NR	NR	NR	NR
Imazosulfuron (Celero)	G	G-E	G-E	G	F	S	S	S	S	S	NR	NR	S	NR	S
Halosulfuron (Sedgehammer)	G	G-E	G-E	G	F-G	S	S	S	S	S	S	S	S	S	S
MSMA/DSMA/CMA	G	P-F	F	G	G	S-I	I	NR	NR	NR	NR	NR	S-I	NR	I-S
Image + MSMA/DSMA	G	G	G	G	G	S-I	NR	NR	NR	NR	NR	NR	S-I	NR	NR
Sulfentrazone (Dismiss)	G	P-F	F	F	F	S	S	I-S	S	NR	S	S	S	S	S
Sulfentrazone + imazethapyr (Dismiss South)	G	G	G	G	G	S	NR	NR	S	NR	NR	S	S	S	NR
Sulfosulfuron (Certainty)	G	G	G	G	G	S	NR	NR	S	S	NR	S	S	S	NR
Trifloxysulfuron (Monument)	G	G	G	G	G	S	NR	NR	NR	NR	NR	NR	S	NR	NR

¹Repeat applications are necessary for complete control from all herbicides. This interval is from 5 days for MSMA/DSMA and 3 to 5 weeks for Certainty, Celero, Sedgehammer, Monument, or Image.

²E = excellent (>89%) control; F = Fair to Good (70 to 89%), good control sometimes with high rates, however a repeat treatment 1 to 3 weeks later each at the standard or reduced rate is usually more effective; P = poor (<70%) control in most cases.

³S=Safe at labeled rates; I=Intermediate safety, use at reduced rates; NR=Not Registered for use on and/or damages this turfgrass; D=Dormant turf only.

These are relative rankings and depend on many factors such as environmental conditions, turfgrass vigor or health, application timing, etc., and are intended only as a guide.

POSTEMERGENCE SEDGE CONTROL (Refer to Herbicide Label for Specific Turf Species Use Listing)¹

COMMON NAME (lbs ai/acre)	TRADE NAME (product rate/acre)	WEEDS CONTROLLED	TURFGRASS USE	COMMENTS
bentazon (1 to 2 lb)	Basagran T&O 4L (2-4 pts) Lescogran 4L (2-4 pts)	Yellow nutsedge, globe sedge, annual sedge and many annual broadleaf weeds	Bahiagrass Bermudagrass Centipedegrass Fine fescue Kentucky bluegrass St. Augustinegrass Tall fescue	Apply when yellow nutsedge is actively growing under good soil moisture conditions. Thorough spray coverage is necessary as will repeat applications in 10 to 14 days. Will not satisfactory control purple nutsedge. Not labeled for golf greens. A pre-packaged combination of bentazon and atrazine is available as Prompt. Benzothiadiazole herbicide.
halosulfuron (0.03 to 0.06 lb)	Sedgehammer 75WP (0.66 to 1.3 oz) Sanda 75WP (0.66 to 1.3 oz)	Most nutsedges and kyllinga species; groundsel, purslane		Note the low use rate, also labeled on paspalum. Add 0.5% nonionic surfactant (½ gal/100 gal). Nutsedges should be actively growing when treated. Spot treat with 0.9 grams Sedgehammer 75WP + a fl oz surfactant per gallon of water. Repeat application(s) 3 to 4 weeks apart will be needed for complete control. Not labeled for golf greens. Note: Sandea is for Turfgrass Sod and Seed Farms only. Sulfonylurea herbicide.
MSMA (2.0 lbs)	Several brands	Yellow nutsedge, annual (water) sedge	Bermudagrass Zoysiagrass	Repeat application will be needed 10 to 14 days apart. Use a wetting agent. Some turf discoloration can be expected. Organic arsenical herbicide.
sulfosulfuron (0.035 to 0.059)	Certainty 75WDG (0.75 to 1.25 oz)	Most sedges & kyllinga species Also controls certain broadleaves and annual bluegrass		Repeat application may be needed 3 to 4 weeks after the initial for perennial plants. Will injure/control cool-season turfgrass including tall fescue. Add 0.25% v/v nonionic surfactant. Sulfosulfuron is safe on all major warm-season turfgrasses. Refer to specific label for additional tolerant turfgrasses and susceptible weeds. Sulfonylurea herbicide.
trifloxysulfuron (0.015 to 0.026)	Monument 75DF (0.33 to 0.56 oz)			
imazaquin 0.375 to 0.5 lb)	Image 1.5LC (2-2.5 pts)	Purple nutsedge, kyllinga, sandspur, wild garlic, some broadleaves	Bermudagrass Centipedegrass St. Augustinegrass Zoysiagrass	Add a nonionic surfactant at 0.25% (1 qt/100 gal). Do not apply to newly seeded, sodded, or sprigged areas or during spring transition . Not labeled for use on bahiagrass, cool-season grasses, or golf greens. Repeat applications may be required as weeds mature. For wild garlic/onion control, apply at 2 pts/A during December followed with 1 to 1.5 pt/A in early March. Treated turf may have a compacted growth habit and inhibited seedhead formation. Imidazolinone herbicide.
imazaquin (0.38 lb) + MSMA (1 to 2 lbs)	Image 1.5LC (2 pts) + Several Brands	Most sedges and kyllinga species.	Bermudagrass	Same as for MSMA and imazaquin. Repeat applications may be required as weeds mature.
imazosulfuron (0.38 to 0.66 lb)	Celero 75WDG (8 to 14 oz)	Most sedges and kyllinga species + some broadleaves	Bermudagrass, Bentgrass, Bentpedegrass, Fine/tall fescue, Ky. bluegrass, Perennial ryegrass, St. Augustinegrass, Zoysiagrass	Repeat application 21 after the initial may be required for complete control. Do not treat wet turf or to golf course putting greens. Add NIS at 0.25% v/v. Sulfonylurea herbicide.

sulfentrazone (0.125 to 0.375)	Dismiss 4L (4 to 12 oz)	Suppresses and controls annual sedges, yellow nutsedge and kyllingas. Also control various broadleaf weeds.	Bahiagrass Bentgrass Bermudagrass Buffalograss Carpetgrass Centipedegrass Fine Fescue Kentucky bluegrass Ryegrass Seashore Paspalum St. Augustinegrass Tall Fescue Zoysiagrass	Add a nonionic surfactant at 0.25 % v/v (1 quart per 100 gallons of spray solution). Good coverage is needed for optimum control. Rates less than ¾ pints/acre will generally suppress most sedges for at least 60 days requiring a second application 5 weeks following the initial. Temporary discoloration may results due to use of surfactant. Test compatibility of surfactant before use. Several combination products containing sulfentrazone are available.
sulfentrazone + imazethapyr (0.29 to 0.45 lbs)	Dismiss South 4L (9.5 to 14.4 oz)	Same weeds as Dismiss plus purple nutsedge and others.	Bahiagrass Bermudagrass Buffalograss Centipedegrass Kikuyugrass Zoysiagrass	Use only on well established labeled turfgrass species. Do not use with 4 weeks of reseeding, overseeding, or sprigging. Do not use on golf course greens or tees or directly to landscape ornamentals or ornamental beds. Suggested split application rate options are 9.5 oz followed by 4.9 oz/acre or 7.2 oz followed by 7.2 oz/acre 35 days after the initial for both. Aryl-triazinone + imidazolinone herbicide.

¹Presence of a herbicide in this listing does not constitute a recommendation. Trade names are used with the understanding that no endorsement is intended or no criticism is implied of similar products not mentioned. All chemicals should be used in accordance with the manufacturer's instructions. The following conversions may be useful. Gal/acre x 2.938 = oz/1000 ft²; Qt/acre x 0.7346 = oz/1000 ft²; Pint/acre x 0.3673 = oz/1000 ft²; lbs/acre x 0.02296 = lb/1000 ft².

Managing Herbicide Resistant Weeds

Bert McCarty

Herbicide resistant weeds in turf, such as *Poa annua*, spurge, goosegrass, and crabgrass, are becoming more prevalent. Fortunately, this can be contained if prudent action is taken. The following table summarizes the main herbicides used in turf including their timing (Pre- vs Post-emergence), their mechanism of action within plant (how they control them), and the various active ingredients. Rotating between and tank-mixing herbicides with different mechanisms of action are keys to delaying or preventing herbicide resistant weeds from dominating a population.

Timing	Mechanism of Action	Active Ingredient (Trade Name Example)
PRE	Cellulose biosynthesis inhibition	Indaziflam (Specticle)
	Mitotic (microtubule) inhibition	Benfen (Balan)
		Dithiopyr (Dimension)
		Oryzalin (Surflan)
		Pendimethalin (Pendulum)
		Prodiamine (Barricade)
		Trifluralin (Treflan)
	Lipid biosynthesis inhibition	Bensulide (Bensumec)
Long-chain fatty acid inhibition	Dimethenamid (Tower)	
	Metolachlor (Pennant)	
PRE/POST	Mitotic (microtubule) inhibition	Pronamide (Kerb)
	Photosystem II inhibition – Site A	Atrazine (Aatrex)
		Metribuzin (Sencor)
		Simazine (Princep)
	Lipid biosynthesis inhibition	Ethofumesate (Prograss)
	Protoporphyrinogen oxidase (PPO) inhibition	Flumioxazin (SureGuard)
Oxadiazon (Ronstar)		
POST	Acetolactate synthase (ALS) inhibition	Bispyribac-sodium (Velocity)
		Chlorsulfuron (Corsair)
		Flazasulfuron (Katana)
		Foramsulfuron (Revolver)
		Imazaquin (Image)
		Metsulfuron (Manor)
		Rimsulfuron (TranXit)
		Sulfosulfuron (Certainty)
		Thiencarbazone-methyl
		Trifloxysulfuron (Monument)
	Acetyl CoA Carboxylase (ACCase) inhibition	Clethodim (Envoy)
		Fenoxprop (Acclaim Extra)
		Fluzafop (Fusilade)
		Sethoxydim (Vantage)
	Auxin agonist (growth regulators)	Clopyralid (Lontrel)
2,4-D (Weedone)		

Timing	Mechanism of Action	Active Ingredient (Trade Name Example)
		Dicamba (Banvel)
		Fluroxpyr (Spotlight)
		Mecoprop, MCPP (Mecomec)
		Quinclorac (Drive) (broadleaves)
	Carotenoid biosynthesis (HPPD, hydroxyphenyl-pyruvate-dioxygenase) inhibition	Mesotrione (Tenacity)
		Topramezone (Pylex)
	Cellulose biosynthesis inhibition	Quinclorac (Drive) (grasses)
	Enolpyruvyl Shikimate-3 Phosphate (EPSP) synthase inhibition	Glyphosate (Roundup)
	Glutamine synthetase inhibition	Glufosinate (Finale)
	Photosystem I inhibition	Diquat (Reward)
	Photosystem II inhibition – Site A	Amicarbazone (Xonerate)
	Photosystem II inhibition – Site B	Bentazon (Basagran)
		Bromoxynil (Buctril)
	Photosystem II inhibition – different binding site	Siduron (Tupersan)
	PPO or Protox (protoporphyrinogen oxidase) inhibition	Carfentrazone (Quicksilver)
		Sulfentrazone (Dismiss)
	Unknown	MSMA, DSMA