

Chapter VII—2021 N.C. Agricultural Chemicals Manual

Table 7-13. Chemical Weed Control in Hay Crops and Pastures

Weed	Herbicide, Mode of Action, and Formulation	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Precautions and Remarks
Hybrid Bermudagrass, (Coastal, Tifton 44)				
Young annual broadleaf weeds	2,4-D amine, MOA 4 (4 SL)	1 qt	1	Apply after sprigging. Gives little preemergence weed control. Later applications may be needed to control broadleaf weeds.
Sorghum-Sudan Hybrids, Preemergence				
Annual broadleaf and grass weeds	atrazine, MOA 5 (4 L) (90 DF, 90 WDG)	3.2 to 4 pt 1.8 to 2.2 lb	1.6 to 2	Use only on silt-loam, clay loam, and clay soils with more than 1% organic matter. Use lower rates on soils 1% to 1.5% organic matter and higher rates on soils having more than 1.5% organic matter. On highly erodible soils (as defined by SCS), if conservation tillage is practiced, leaving at least 30% of soil covered with plant residues at planting, apply a maximum of 2 pounds active per acre as broadcast spray. If soil coverage with plant residue is less than 30% at planting, a maximum of 1.6 pounds active per acre may be applied. On soils not highly erodible, apply 2 pounds active per acre as a broadcast spray.

Chemical Weed Control in Lawns and Turf

F. H. Yelverton and T. W. Gannon, Crop and Soil Sciences Department

Note: A mode of action code has been added to the Herbicide and Formulation column of this table. Use MOA codes for herbicide resistance management. See Table 7-10B, Herbicide Modes of Action for Hay Crops, Lawns and Turf for details concerning active ingredients, brand names, chemical families and modes of action.

Several of the preemergence herbicides are available on fertilizer carriers for homeowner application.

Table 7-14. Chemical Weed Control in Lawns and Turf

Herbicide and Formulation	Amount of Formulation Per 1,000 sq ft	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Precautions and Remarks
Preemergence Control, Smooth and Large Crabgrass, Goosegrass, Foxtails, other annual grasses				
benefin, MOA 3 (2.5 G)	2.75 lb	120 lb	3	Safe to apply to all established turfgrass except bentgrass. Do not apply in the spring to lawns seeded the previous fall or to golf course greens. Do not use on newly sprigged turfgrasses.
[benefin + trifluralin], MOA 3 + 3 (0.86 G)	8 lb	349 lb	3	Use on lawns and golf course fairways of bahiagrass, bentgrass, bermudagrass, centipedegrass, fescue, perennial ryegrass, St. Augustinegrass, and zoysiagrass.
bensulide, MOA 8 (4 EC) (8.5 G, 12.5 G)		Varies, several concentrations available	10	May be applied to all established turfgrass and dichondra, residential lawns, and golf course greens and tees. Limit 2 applications per year to greens and tees. Do not use on newly sprigged turfgrasses. Not effective for goosegrass control.
[bensulide + oxadiazon], MOA 8 + 14 (6.56 G)	2.6 lb	116 lb	6 + 1.5	Controls crabgrass and goosegrass. Use on established bermudagrass, zoysiagrass, tall fescue, bentgrass, perennial bluegrass, or perennial ryegrass fairways and tees. Use also on bermudagrass and bentgrass greens.
dithiopyr, MOA 4 (2 EW, 2 L) (40 WP)	0.75 fl oz 0.46 oz	1 qt 20 oz	0.5	May be applied to most all cool-season and warm-season turfgrasses except colonial bentgrass. See label for injury precautions regarding certain varieties. Also controls pre-tillered crabgrass. Split applications recommended in southern and coastal regions of the state (0.25 pound a.i. at 8-week intervals). Timely irrigation or rainfall is critical for activation.
indaziflam, MOA 21 (20 WSP)	0.057 to 0.115 oz	2.5 to 5 oz	0.03125 to 0.0625	Use only on established turf (1 year after seeding) such as bermudagrass, zoysiagrass, centipedegrass, St. Augustinegrass, seashore paspalum, and bahiagrass. Labeled for commercial and residential lawns, golf courses (roughs, tees, fairways), sod farms, athletic fields, parks and cemeteries. Use a minimum of 2.5 ounces per acre for crabgrass, annual bluegrass and broadleaf weed control and a minimum of 3.75 ounces per acre for goosegrass, annual sedge and kyllinga species control. Apply up to 2.5 ounces per acre on centipedegrass and St. Augustinegrass due to tolerance concerns. For all other tolerant turfgrasses, do not exceed 5 ounces per acre in a single application or 7.1 ounces per acre within a calendar year. There is an 8-month overseeding restriction following a 2.5 ounces per acre application. Can spring 2 months following application, or if sprigged first, wait 4 months before spraying. Can sod 4 months following application, or if sodded first wait 2 months after rooting before spraying.
(0.622F)	0.69 to 0.23 fl oz	3 to 10 fl oz	0.01458 to 0.0486	Use up to 6 fluid ounces per acre on common bermudagrass, centipedegrass and St. Augustinegrass and 10 fluid ounces per acre on hybrid bermudagrass, zoysiagrass and bahiagrass established 16 months in areas such as golf course roughs and fairways, residential and commercial turf, sod farms, athletic fields, parks and cemeteries. 10 fluid ounces per acre needed for annual sedge and kyllinga species control. Don't exceed 18.5 fluid ounces per acre per year. Do not vertical mow 1 month before or after application. Irrigate within 2 days of treatment for maximum benefit. Check label for split or multiple application rates and timings. Delay overseeding 10 months if 4.5 to 6 fluid ounces used and 12 months if 6 to 9 fluid ounces used. For sod production, only apply to bermudagrass, zoysiagrass or bahiagrass. Apply if 80% ribbon coverage and before 4 months prior to harvest. Wait 6 month after treatment if sodding bare ground. Apply to actively growing sod established for 3 months.
(0.0224 G)	2.9 to 4.6 lb	125 to 200 lb	0.028 to 0.045	Use on same warm season turf species established at least 16 months and sites as above. Do not exceed 400 pounds product per year. Allow a 15 feet buffer from cool season turf areas. Do not apply upslope from cool season turf.
metolachlor, MOA 15 (7.62 EC)	0.96 fl oz	2.6 pt	2.48	Apply to established bermudagrass, centipedegrass, St. Augustinegrass, bahiagrass, and zoysiagrass. Can apply up to 4.2 pints per acre per year to same area used for commercial sod production.
napropamide, MOA 15 (50 DF)	1.5 to 2.2 oz	4 to 6 lb	2 to 3	Use in established bahiagrass, bermudagrass, centipedegrass, St. Augustinegrass, and tall fescue.

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Table 7-14. Chemical Weed Control in Lawns and Turf

Herbicide and Formulation	Amount of Formulation Per 1,000 sq ft	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Precautions and Remarks
Preemergence Control, Smooth and Large Crabgrass, Goosegrass, Foxtails, other annual grasses (continued)				
oryzalin, MOA 3 (4 AS, 4 L)	1.5 fl oz	2 qt	2	Use on established bahiagrass, centipedegrass, tall fescue, St. Augustinegrass, zoysiagrass, and bermudagrass except greens and tees. A total of 3 quart per acre may be used if application is split by applying 1.5 quarts per acre followed by 1.5 quarts per acre 8 to 10 weeks later. Follow label directions. Do not apply in the spring or summer to tall fescue reseeded the previous fall.
oryzalin, MOA 3 (85 WDG)	0.64 to 0.88 oz	1.75 to 2.4 lb	1.4875 to 2.04	Observe same turf tolerances and tall fescue precautions as above. Successful preemergence activity should occur if activated by 0.5 inch of water within 21 days of application. Apply 2.4 pounds per acre as a single application or 1.75 pounds per acre in sequential applications spaced 12 weeks apart.
oxadiazon, MOA 14 (2 G)	2.3 to 4.6 lb	100 to 200 lb	2 to 4	Use in established perennial bluegrass, perennial ryegrass, bentgrass, bermudagrass, tall fescue, zoysiagrass, and St. Augustinegrass. Red fescue is not tolerant. Do not apply to dichondra, centipedegrass, putting greens or tees, or to newly seeded areas. Do not apply to bentgrass mowed at less than 3/8 inch. Do not apply to wet turf. Rainfall or irrigation after application will improve weed control activity. May be applied when sprigging bermudagrass and zoysiagrass. Do not apply to home lawns.
oxadiazon, MOA 14 (50 WP)	1.5 to 2.2 oz	4 to 6 lb	2 to 3	Use in dormant, established bermudagrass, St. Augustinegrass, and zoysiagrass in fairways and parks. Should be applied at least 2 to 3 weeks before greenup of turf. May be applied when sprigging bermudagrass and zoysiagrass. Do not use on home lawns.
oxadiazon, MOA 14 (3.17 SC)	1.85 to 2.8 fl oz	2.52 to 3.81 qt	2 to 3	Use in dormant, established bermudagrass, St. Augustinegrass, and zoysiagrass in fairways and parks. May apply 2 lb a.i. per acre when sprigging bermudagrass. Apply at least 2 to 3 weeks before greenup of turf. Do not use on home lawns.
[oxadiazon + prodiamine], MOA 14 + 3 (1.2 G)	4.5 lb	200 lb	2 + 0.4	Use on turf, golf courses (excluding putting greens) of established bermudagrass, zoysiagrass, St. Augustinegrass, ryegrass, centipedegrass, bentgrass, bluegrass, and tall fescue. Contains 38% N. Apply to dry foliage.
pendimethalin, MOA 3 (2 G) (0.86 G) (1.29 G)	1.72 to 3.44 lb 2.67 to 5.34 lb 2.67 lb	75 to 150 lb 116 to 232 lb 116 lb	1.5 to 3 1 to 2 1.5	Use on established bahiagrass, bermudagrass, centipedegrass, fine fescue, Kentucky bluegrass, perennial ryegrass, St. Augustinegrass, tall fescue, and zoysiagrass. Do not use on winter-overseeded grasses. Wait 4 months after treatment to seed or sod. Do not apply to newly seeded turf until after the 4 th mowing. Do not apply to newly sprigged turf until 5 months establishment.
pendimethalin, MOA 3 (3.8 CS)	1.15 to 2.3 fl oz	3.1 to 6.3 pt	1.5 to 3	Use on noncropland as well as established nonresidential and residential turf areas mowed at least 4 times consisting of bahiagrass, bermudagrass, buffalograss, centipedegrass, St. Augustinegrass, zoysiagrass, Kentucky bluegrass, perennial ryegrass, bentgrass, established <i>Poa annua</i> (0.5 inch height or taller), fine fescue, and tall fescue. Do not use on bentgrass or <i>Poa annua</i> greens and tees. If lower rate is applied initially, repeat in 6-8 weeks for extended control. Do not reseed or overseed into treated turfgrass for 3 months, or sprig turfgrass for 5 months following application. Do not exceed 4.2 pints per acre on residential and sod farm turfgrass.
[pendimethalin + dimethemamid], MOA 3 + 15 (1.75 G)	2.3 to 4.6 lb	100 to 200	1.75 to 3.5	Use on residential, commercial, recreational, sod farm and golf course turf, excluding greens. Tolerant turf species include bermudagrass, centipedegrass, St. Augustinegrass, seashore paspalum and zoysiagrass. For extended control, make sequential applications within 5 to 8 weeks not to exceed 400 pounds per acre. Irrigate within 24 hours of application for optimum control. Following application, wait 3 months to overseed, reseed or sprig. If sprigged first, wait 2 months for root establishment to treat. On new sod, mow at least twice before application. On new seedlings, mow at least 4 times before application. Wait 2 weeks after aerification or verticutting before applying.
prodiamine, MOA 3 (65 WG) (4 FL)	0.185 to 0.83 oz 0.23 to 1.1 fl oz	0.5 to 2.3 lb 0.625 to 3 pt	0.325 to 1.5 0.3125 to 1.5	May be used on established bahiagrass, bermudagrass, centipedegrass, St. Augustinegrass, zoysia, tall fescue, creeping red fescue, perennial bluegrass and ryegrass, and creeping bentgrass. Do not apply to greens. May apply when sprigging or plugging bermudagrass, up to 0.8 pound product per acre.
prodiamine, MOA 3 (0.5 G)	1.5 to 6.9 lb	64 to 300 lb	0.32 to 1.5	See precautions for prodiamine 65 WG and 4 FL above except may be used on established turf only. Do not apply more than 150 pounds per acre per application. Do not make more than two applications per calendar year. Wait at least 60 days after initial application before making a second application. Prodiamine is coated on a 32-3-12 dry fertilizer carrier.
siduron, MOA 7 (50 WP)	7.3 oz	20 lb	10	Use only on bluegrass, fescue, perennial ryegrass, and certain bentgrasses (check label). Can be used at the rate of 8 pounds of formulation when seeding bentgrass, bluegrass, fescue, and ryegrass. Can be used in newly sprigged or established zoysia. Do not use on bermudagrass, carpetgrass, centipedegrass.
Preemergence Control, Goosegrass				
dimethenamid, MOA 15 (6 L)	0.48 to 0.73 fl oz	21 to 32 fl oz	1 to 1.5	Use on residential, commercial, recreational, sod farm and golf course turf, excluding greens. Apply 21 ounces to established bentgrass, bluegrass species, fescue species and perennial ryegrass maintained at 0.5 inch cut but expect yellowing and stand reduction. Apply 32 ounces to bahiagrass, bermudagrass species, centipedegrass, St. Augustinegrass, seashore paspalum and zoysiagrass. For extended control, make sequential applications within 5 to 8 weeks at 32 fluid ounces per acre rate. Irrigate within 24 hours of application for optimum control. Following application, wait 6 weeks to overseed or reseed, wait 2 months to sprig, wait 2 mowings for new sod, and wait 4 mowings for newly seeded turf.
Preemergence Control, Annual Bluegrass (<i>Poa annua</i>)				
[benfalin + trifluralin], MOA 3 + 3 (0.86 G)	4 to 8 lb	174 to 349 lb	1.5 to 3	Apply during late summer before <i>Poa annua</i> germinates. Do not apply to turf areas that are to be overseeded.
bensulide, MOA 8 (4 EC) (8.5 G, 12.5 G)		several concentrations available	12.5	See section on preemergence control of crabgrass and goosegrass or product labels for turfgrass tolerance, precautions and remarks for the listed preemergence annual bluegrass herbicides.
dithiopyr, MOA 4 (2 EW, 2 L) (40 WP)	0.75 fl oz 0.46 oz	1 qt 20 oz	0.5	Timely irrigation or rainfall is critical for activation.

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Herbicide and Formulation	Amount of Formulation Per 1,000 sq ft	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Precautions and Remarks
Preemergence Control, Annual Bluegrass (<i>Poa annua</i>) (continued)				
indaziflam, MOA 21 (20 WSP)	0.057 to 0.115 oz	2.5 to 5 oz	0.031 to 0.063	
(0.622 F)	0.138 to 0.23 fl oz	6 to 10 fl oz	0.029 to 0.049	
(0.0224 G)	2.9 to 4.6 lb	125 to 200 lb	0.028 to 0.045	
metolachlor, MOA 15 (7.62 EC)	0.48 to 0.96 fl oz	1.3 to 2.6 pt	1.24 to 2.48	
napropamide, MOA 15 (50 DF)	1.5 to 2.25 oz	4 to 6 lb	2 to 3	
oryzalin, MOA 3 (4 AS)	1.1 fl oz	1.5 qt	1.5	
(85 WDG)	0.64 to 0.88 oz	1.75 to 2.4 lb	1.4875 to 2.04	Apply full rate unless potentially thin turfgrass cover is a problem caused by dense poa infestation.
oxadiazon, MOA 14 (2 G)	2.3 to 4.6 lb	100 to 200 lb	2 to 4	
pendimethalin, MOA 3 (2 G)	1.72 to 3.44 lb	75 to 150 lb	1.5 to 3	
(0.86 G)	2.67 to 5.34 lb	116 to 232 lb	1 to 2	
(1.29 G)	2.67 lb	116 lb	1.5	
(3.8 CS)	1.15 to 1.55 fl oz	3.1 to 4.2 pt	1.5 to 2	
(pendimethalin + dimethemamid), MOA 3 + 15 (1.75 G)	2.3 to 4.6 lb	100 to 200	1.75 to 3.5	
prodiamine, MOA 3 (65 WG)	0.185 to 0.83 oz	0.5 to 2.3 lb	0.325 to 1.5	
(4 FL)	0.23 to 1.1 fl oz	0.625 to 3 pt	0.3125 to 1.5	
pronamide, MOA 3 (3.3 SC)	0.46 to 1.29 fl oz	1.25 to 3.5 pt	0.5 to 1.5	Not for home use. Can be applied from Sept. 15 to Feb. 1 for preemergence or postemergence annual bluegrass control in bermudagrass, zoysiagrass, centipedegrass, and St. Augustinegrass grown for sod, nonresidential or industrial sites, golf course turf, and stadium or professional athletic fields. 1.25 to 2.5 pints per acre provides preemergence to pre tiller stage control. 2 to 2.5 pints per acre provides postemergence control from early tiller to early seedhead stage. 2.5 to 3.5 pints per acre for postemergence control at seedhead stage. Henbit and chickweed species controlled at preemergence timings. Can be used for removal of overseeded grasses; do not overseed if it is desired to maintain a stand. Do not overseed treated area within 90 days of treatment. Injury symptoms from postemergence applications can take up to 5 weeks to develop.
Preemergence Control, Annual Bluegrass in Overseeded Bermudagrass				
benefin, MOA 3 (2.5 G)	2.75 lb	120 lb	3	Apply in late summer before <i>Poa annua</i> germinates. Perennial ryegrass can be overseeded 6 weeks after benefin is applied.
dithiopyr, MOA 4 (2 EW, 2 L) (40 WP)	0.75 fl oz 0.46 oz	1 qt 20 oz	0.5	Apply in late summer before <i>Poa annua</i> germinates. Perennial ryegrass can be overseeded 6 to 8 weeks after application. Apply only on well-established bermudagrass. Do not reapply in fall or winter after overseeding unless injury can be tolerated.
prodiamine, MOA 3 (65 WG)	0.213 to 0.367 oz	0.58 to 1 lb	0.37 to 0.65	Use on golf courses (excluding putting greens) when overseeding with perennial ryegrass at a minimum seeding rate of 350 pounds per acre. Apply 8 to 10 weeks before overseeding and expect 70% or greater control. For best potential control, use higher rate and shorter time interval before overseeding. However, this could increase ryegrass seedling mortality or temporarily reduce root growth.
Preemergence and Postemergence Control, Annual Bluegrass				
ethofumesate, MOA 8 (1.5 EC)	2 fl oz	2.67 qt	1	For control of annual bluegrass in dormant bermudagrass overseeded with perennial ryegrass or in established perennial ryegrass turf. Rates are per application. The first application should be 30 to 45 days after overseeding with perennial ryegrass. The second application should be 21 to 28 days later. Do not apply ethofumesate to overseeded bermudagrass after Jan. 1 in N.C.
ethofumesate, MOA 8 (4 SC)	0.55 to 1.47 fl oz	1.5 to 4 pt	0.75 to 2	Must be professionally applied to residential and nonresidential turf including golf courses and sod farms. May be applied to established perennial ryegrass, Kentucky bluegrass, creeping bentgrass, tall fescue, St. Augustinegrass, and dormant bermudagrass. Do not apply to putting greens. Delay application at least 8 weeks after a pgr application. Fall annual bluegrass control best during period of maximum germination. Spring applications most effective following fall applications. For overseeded bermudagrass, apply 1 to 2 weeks after perennial ryegrass emergence and repeat at 21- to 28-day intervals. Do not apply to bermudagrass 4 weeks prior to breaking winter dormancy.
Preemergence and Postemergence Control, Various Weeds				
imazaquin + prodiamine + simazine (5 L)	1.1 to 1.47 oz	48 to 64 oz	1.88 to 2.5	For use on established bermudagrass, centipedegrass, St. Augustinegrass, and Zoysiagrass. Approved application sites are golf courses (excluding putting greens), athletic fields, commercial and residential turf, and sod farms. Should be applied from 15 September to 31 May for preemergent and early postemergent control of annual bluegrass when applied in fall. Will also provide preemergent control of summer annual grasses such as crabgrass if applied prior to grass germination in late winter/early spring. Also provides control of various broadleaf weeds. See label for additional precautions and weeds controlled.
Postemergence Control and Seedhead Suppression, Annual Bluegrass in Overseeded Bermudagrass Fairways, Tees				
bispyribac-sodium, MOA 2 (17.6 SG)	0.046 to 0.138 oz	2 to 6 oz	0.021875 to 0.065625	Do not apply to putting greens, ryegrass mowed to less than 0.375 inch, or non-overseeded bermudagrass. Apply between Feb. 1 and March 15. Make first application when annual bluegrass begins flowering. If actively flowering, use the low rate and re-treat in 28 to 35 days. If not actively flowering, use the low rate and retreat in 14 to 21 days with the low rate. Do not apply if air temperature is less than 50°F within 3 days after application. Check label for further special instructions.

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Postemergence Control and Seedhead Suppression, Annual Bluegrass in Overseeded Bermudagrass Fairways, Tees (continued)				
amicarbazone, MOA 5 (70 WG)	0.023 to 0.23 oz	1 to 10 oz	0.044 to 0.44	Also tolerant to 6-month established turfgrasses such as bahiagrass, centipedegrass, seashore paspalum, St. Augustinegrass, zoysiagrass, bentgrass, Kentucky bluegrass, perennial ryegrass, fine and tall fescue. Labeled for use on golf course, sod farm, residential, commercial, athletic field and roadside turf. Bentgrass tees: 1 ounce/acre at 7 day intervals for 4 applications. Bentgrass roughs and fairways: 2 to 3 ounces/acre for 14 to 21 day intervals for 2 applications. Cool season turf: 2 to 4 ounces/acre for 14 to 21 day intervals for 2 applications. Warm season turf: 3 to 10 ounces/acre for 14 to 21 day intervals for 2 applications not to exceed 10 ounces/acre per year. Allow 4 weeks before cutting or lifting sod. Allow 1 week before overseeding winter grasses.
Postemergence Control, Annual Bluegrass, Overseeded Perennial Ryegrass, Tall Fescue, <i>Poa trivialis</i>				
flazasulfuron, MOA 2 (25 DG)	0.011 to 0.069 oz	0.5 to 3 oz	0.0078 to 0.0469	For use on well-established bermudagrass, zoysiagrass, centipedegrass, and seashore paspalum grown turf including golf courses (including fairways, roughs, greens (bermudagrass and seashore paspalum only), tees, collars and approaches), industrial parks, tank-sod- and seed farms, cemeteries, athletic field and commercial lawns. Residential turf applications are limited to spot applications. Apply a maximum of 1.5 ounces per acre on fully green centipedegrass and seashore paspalum. 3 ounces per acre needed for annual bluegrass control and best if applied in spring. 0.5 to 1.5 ounces per acre will control perennial and Italian ryegrass. For clumpy ryegrass, use 1.5 to 3 ounces per acre. 1.5 ounces per acre needed for tall fescue control. 2.25 to 3 ounces per acre needed for <i>poa trivialis</i> control. Include a nonionic surfactant at 0.25% by volume.
foramsulfuron, MOA 2 (0.19 SC)	0.2 to 0.6 fl oz	8.8 to 26.2 fl oz	0.013 to 0.039	For use on bermudagrass and zoysiagrass grown on home lawns, golf courses and sod farms. Do not use on warm season turfgrass collars surrounding bentgrass greens. May be applied up to 1 week prior to overseeding. Do not apply within 2 weeks of bermudagrass sprigging. Apply in 25 to 60 gallons water per acre. Rainfast after 2 hours. Surfactant not required.
rimsulfuron, MOA 2 (25 DF)	0.011 to 0.092 oz	0.5 to 4 oz	0.0078 to 0.0625	May be applied to bermudagrass, zoysiagrass and centipedegrass on professionally managed sports facilities at professional and collegiate levels, golf courses, sod farms, roadsides, industrial and commercial lawns. For annual bluegrass control, apply November through December and again February through March if needed at 2 ounces per acre. May be applied 10 to 14 days prior to overseeding. For overseeded removal, apply 2 ounces per acre 3 to 4 weeks before desired removal date, and repeat 3 weeks later if needed. For weed control along roadsides, apply 4 ounces per acre if single application only. A nonionic surfactant at 0.25% by volume or an oil adjuvant such as crop oil concentrate and modified seed oil at 1% by volume are required. Do not apply to cool-season turfgrasses, residential lawns or newly sprigged/sodded bermudagrass.
[metsulfuron + rimsulfuron], MOA 2 + 2 (37 WG)	0.0344352 oz	1.5 oz	0.0346875	Use on well-established bermudagrass and zoysiagrass grown on nonresidential turf including golf courses, sod farms, industrial and commercial lawns, and professionally managed college and professional sports fields. Overseeding can occur 2 months after application. Include a nonionic surfactant at 0.25% by volume.
sulfosulfuron, MOA 2 (75 DG)	0.017 to 0.046 oz	0.75 to 2 oz	0.035 to 0.09375	May be applied to certain ornamental native grasses and also bermudagrass species, zoysiagrass, centipedegrass, St. Augustinegrass, and kikuyugrass grown on sod farms, golf courses (excluding greens), commercial and residential turf that is highly managed, and other noncrop areas. Use 1.5 to 2 ounces per acre for fall annual bluegrass control 7 to 10 days before overseeding. Use 0.75 to 1.25 ounces per acre for fall or winter control in nonoverseeded bermudagrass and reapply if needed but not before 21 days after initial application. For tall fescue control, two applications may be required at 4- to 10-week intervals. Perennial ryegrass control not as complete as with foramsulfuron, rimsulfuron, or trifloxysulfuron. Use a nonionic surfactant at 0.25% by volume. Do not exceed 2.66 ounces per acre per year.
trifloxysulfuron, MOA 2 (75 WG)	0.0023 to 0.0129 oz	0.1 to 0.56 oz	0.0047 to 0.0263	May be applied to residential bermudagrass and zoysiagrass and also on golf courses, sod farms, and other nonresidential turf areas. A nonionic surfactant at 0.25 to 0.5% by volume is recommended. Temporary discoloration may occur if used with MSO or COC. May be applied 3 weeks prior to overseeding. Use rates of 0.1 to 0.3 ounces per acre to remove overseeded perennial ryegrass and <i>Poa trivialis</i> to aid bermudagrass spring transition. Labeled turf species can be seeded or sprigged into treated areas 4 weeks after application.
Preemergence and Postemergence Control, Annual Bluegrass and certain winter annual broadleaf weeds				
atrazine, MOA 5 (4 L) (90 DF, 90 WG)	0.75 to 1.5 fl oz 0.025 to 0.05 lb	1 to 2 qt 1.1 to 2.2 lb	1 to 2	Use on centipedegrass, St. Augustinegrass, and dormant bermudagrass. Apply Nov. 15 to Dec. 31. Follow label directions.
simazine, MOA 5 (90 WDG, 90 DF) (4 L)	0.4 to 0.8 oz 0.75 to 1.5 fl oz	1.1 to 2.2 lb 1 to 2 qt	1 to 2	Use on bermudagrass, centipedegrass, St. Augustinegrass, and zoysiagrass. See label for instructions on newly sprigged turfgrass or on hybrid bermudagrass. Apply Nov. 15 to Dec. 15. Follow label directions.
Preemergence Control, Certain Broadleaf Weeds				
isoxaben, MOA 21 (75 DF, 75 WG)	0.25 to 0.5 oz	0.66 to 1.33 lb	0.5 to 1	All established turfgrasses are tolerant. However, do not apply to putting greens or turfgrass grown for seed. Check label for specific weeds controlled.
pendimethalin, MOA 3 (3.8 CS)	1.15 to 1.55 fl oz	3.1 to 4.2 pt	1.5 to 2	See section on preemergence control of crabgrass or product label for turfgrass tolerance. Provides preemergence control of summer broadleaf weeds, such as prostrate spurge, prostrate knotweed, and purslane species, as well as winter broadleaf weeds, such as yellow woodsorrel, hop clover, cudweed species, common chickweed, lawn burweed, henbit, and corn speedwell when applied before expected germination.

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Preemergence Control of Smooth and Large Crabgrass, Goosegrass, Other Broadleaf Weeds				
[isoxaben + dithiopyr]	3.4 to 4.6 lb	140 to 200 lb	1.13 to 1.5	Use on established turfgrasses (creeping bentgrass, Kentucky bluegrass, fine fescue, tall fescue, perennial ryegrass, bahiagrass, bermudagrass, carpetgrass, centipedegrass, seashore paspalum, St Augustinegrass, and zoysiagrass). Do not use on putting greens. Use for preemergent control of annual grasses and broadleaf weeds. See label for a complete list of weeds controlled. Also has postemergent control of small crabgrass (pre-tiller).
Preemergence and Postemergence Control Crabgrass, Goosegrass, Other Annual Grasses, Broadleaf Weeds, Sedges				
mesotrione, MOA 27 (4 SC)	0.092 to 0.183 fl oz	4 to 8 fl oz	0.125 to 0.25	Use on residential turf, golf courses (not greens) and sod farms for pre- and postemergence weed control. Tolerant turfgrasses include St. Augustinegrass, centipedegrass, tall fescue, fine fescue, Kentucky bluegrass, and perennial ryegrass. Add a nonionic surfactant and repeat application after 2 to 3 weeks for improved postemergence control. Tank mix with prodiamine 65 WG for extended preemergence grassy weed control. Can be applied at seeding to all tolerant grasses except fine fescue. After turf germination, wait 4 weeks or until turf has been mowed twice before making a postemergence application. Also controls henbit, chickweed, dandelion, white clover, Florida betony, Florida pusley, ground ivy, oxalis, wild violet, creeping bentgrass, and yellow nutsedge.
[sulfentrazone + prodiamine], MOA 14 + 3 (4 SC)	0.184 to 0.826 fl oz	0.5 to 2.25 pt	0.25 to 1.125	For use in residential and institutional lawns, athletic fields, sod farms, golf course fairways and roughs, roadsides, utility rights-of-way, railways, and industrial areas. Apply to turf following a second mowing if a good root system has been established. Apply up to 12 fluid ounces per acre to bentgrass at 0.5 inch or higher, fine fescue, and perennial ryegrass. Apply 18 to 24 fluid ounces per acre to perennial bluegrass, tall fescue, and all warm season grasses except St. Augustinegrass (do not apply) and bermudagrass (apply 18 to 36 fluid ounces per acre). For sod production, apply 6 months after establishment, and do not harvest within 3 months. Do not apply with adjuvants or surfactants. [Sulfentrazone + prodiamine should not be applied to cool-season turf with N-containing fertilizers unless some short-term discoloration is tolerable.
Postemergence Control, Crabgrass, Goosegrass				
fenoxaprop, MOA 1 (0.57 EC)	0.3 to 0.9 fl oz	0.8 to 2.4 pt	0.057 to 0.174	Use only on perennial ryegrass, fine fescue, tall fescue, Kentucky bluegrass, and zoysiagrass. Reduced vigor or discoloration can occur. Rate depends upon leaf number or tillers of grass weeds and turf tolerance. Check label. A second application may be applied after 14 days.
	0.08 fl oz	3.5 fl oz	0.016	Apply only to established Penncross bentgrass maintained at a minimum cutting height of at least 0.25 inch. Bentgrass should be established for one growing season. Do not apply to greens. Applications should be made at a minimum of 21-day intervals, beginning in the spring when grassy weeds first emerge and are not larger than two-leaf. Repeat applications throughout the summer as new infestations of one- to two-leaf grassy weeds occur. See label for restrictions.
metribuzin, MOA 5 (75 DF)	0.12 to 0.24 oz	0.33 to 0.67 lb	0.25 to 0.5	Recommended for application by commercial applicators only on established bermudagrass turf (such as parks, athletic fields, golf course fairways, cemeteries, and sod farms) that has a mowing height of 0.5 inch or greater. Apply when turf is vigorously growing and not under stress. Repeat if necessary, in 7 to 10 days. Do not make more than two applications per season. Do not apply to greens, tees, or aprons.
sethoxydim, MOA 1 (1 EC)	0.8 to 1.38 fl oz	2.25 to 3.75 pt	0.28 to 0.47	Use in seedling and established centipedegrass and fine fescues. Apply 2.25 pint to grasses up to 6 inches and 3.75 pints to grasses up to 12 inches if turf is tolerant. Does not control yellow and purple nutsedge, annual bluegrass or broadleaf weeds. Apply no sooner than 3 weeks after spring greenup of centipedegrass. Apply before crabgrass becomes extensively tillered. Delay all treatments until newly planted centipedegrass has 3 inches of new stolon growth. Do not mow within 7 days before or after application. Two applications 3 weeks apart will suppress bahiagrass. Additives or adjuvants not required.
Postemergence Control, Smooth and Large Crabgrass, Barnyardgrass, White and Hop Clover, Common Dandelion, Dollarweed, Foxtails				
quinclorac, MOA (27 + 4) (75 DF) (1.5 SL)	0.367 oz 1.45 fl oz	1 lb 2 qt	0.75	For use in residential and nonresidential turf that is established or newly seeded, overseeded, or sprigged. Refer to label for specific varieties. Apply to common and hybrid bermudagrass, Kentucky bluegrass, annual bluegrass, buffalograss, tall fescue, annual and perennial ryegrass, creeping bentgrass, and zoysiagrass. Can also be applied to fine fescue but must be in a blend. Some discoloration of hybrid bermudagrass, creeping bentgrass or fine fescue may occur. Do not apply to bahiagrass, centipedegrass, St. Augustinegrass, or dichondra. Do not use on golf course greens or collars. The addition of methylated seed oil (1.5 pints per acre or 0.55 ounces per 1,000 square feet) or a crop oil concentrate (2 pint per acre or 0.73 ounces per 1,000 square feet) is required for control. Application to weeds under stress will result in poor control. Irrigation 24 hours prior to application is recommended if drought conditions exist. Some ornamental plants are sensitive to quinclorac. See label for further precautions.
Postemergence Control, Smooth and Large Crabgrass, Barnyardgrass, Foxtails, and many broadleaf weeds				
[quinclorac + sulfentrazone + 2,4-D amine + dicamba], MOA (27 + 4) + 14 + 4 + 4 (1.79 L)	1.8 to 3 fl oz	5 to 8 pt	1.12 to 1.79	For use in fully dormant bermudagrass as well as actively growing bermudagrass after spring greenup but use only 5 to 7 pints per acre. Also labeled in fully dormant zoysiagrass as well as cool-season turf including annual bluegrass and ryegrass, perennial bluegrass and ryegrass, and fescue species. Do not apply to bahiagrass, bentgrass (creeping, Seaside, Colonial), centipedegrass, St. Augustinegrass, carpetgrass, and golf course greens, tees, and collars. May be applied to home lawns. Apply to seedling grasses after second or third mowing, or 28 days after emergence. Wait 3 to 4 weeks after sodding, sprigging, or plugging operations to apply. Wait 4 weeks after application to seed.

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Table 7-14. Chemical Weed Control in Lawns and Turf

Herbicide and Formulation	Amount of Formulation Per 1,000 sq ft	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Precautions and Remarks
Postemergence Control, Smooth and Large Crabgrass, Barnyardgrass, Foxtails, and many broadleaf weeds (continued)				
[quinclorac + mecoprop + dicamba], MOA (27 + 4) + 4 + 4 (2.45 SL)	0.5 to 1.45 fl oz	0.68 to 2 qt	0.4165 to 1.225	For use in warm- and cool-season residential and non-residential turf, including but not limited to commercial property, parks, roadsides, schools, athletic fields, cemeteries, and golf courses. May be applied to species of bermudagrass, bluegrass, fescue, and ryegrass as well as creeping bentgrass, seashore paspalum, and zoysiagrass. Use with methylated seed oil at 1.5 pints per acre. Allow 28 days of seedling or sprig growth before application. If treating first, allow 28 days before seeding or sprigging. Do not apply to golf course collars or greens or to turf grown for sod. Use low rate in 2 split applications when treating creeping bentgrass.
[carfentrazone + quinclorac], MOA 14 + (27 + 4) (75 WG)	0.184 to 0.413 oz	8 to 18 oz	0.35 to 0.79	Can use up to 12 ounces per acre 7 days after emergence from seed or sod installation on bluegrass and fescue species and perennial ryegrass; 18 ounces per acre can be used 7 days after seed, sod or sprig operations on bermudagrass species, centipedegrass and seashore paspalum. Wait 14 days after emergence for zoysiagrass. May apply to residential, commercial, and institutional lawns, athletic fields, sod farms, and golf course fairways and roughs. Adjuvants not required but may help on mature weeds.
[sulfentrazone + quinclorac], MOA 14 + (27 + 4) (75 WG)	0.367 to 0.735 oz	1 to 2 lb	0.75 to 1.5	Use up to 21 ounces per acre on well-established tall fescue, Kentucky bluegrass and perennial ryegrass; up to 32 ounces per acre on well-established bermudagrass, centipedegrass, zoysiagrass and seashore paspalum. May be applied to residential, commercial, and institutional lawns, athletic fields, sod farms, and golf course fairways and roughs. After treatment, wait at least 1 month before reseeding, overseeding (use slit seeder for best results), or sprigging. Wait at least 3 months for sod establishment and do not spray within 3 months of harvest. Controls goosegrass in the 1 to 4 leaf stage. Yellow nutsedge and kyllinga species are also controlled. Do not apply with a spray adjuvant.
[fenoxaprop + fluroxypyr + dicamba], MOA 1 + 4 + 4 (0.75 EC)	1.3 to 1.5 fl oz	3.5 to 4 pt	0.33 to 0.375	Tolerant turfgrass species include zoysiagrass, Kentucky bluegrass, perennial ryegrass, fine and tall fescue. May be applied to golf courses excluding greens and tees, athletic fields, commercial and residential turf. Sod farm use is not permitted. Best grass weed control will be achieved when treated from 1 leaf to 4 tiller stage. Do not apply more than 15 pints per acre per year. Do not reapply within 14 days of an application. Surfactant not required. Spot treat using 0.6 to 1 fluid ounces per 1 gallon water.
Postemergence Control, Large Crabgrass, Carpetgrass, Bull Paspalum, Bahiagrass, Foxtails, and many broadleaf weeds, including Chamberbitter, Corn Speedwell, Dichondra, Dollarweed, Doveweed, Florida Betony, Florida Pusley, Lespedeza, Oxalis, Spurge, Virginia Buttonweed, Kyllinga				
[thiencarbazone-methyl + iodosulfuron-methyl + dicamba], MOA 14 + 2 + 4 (68 WG)	0.057 to 0.113 oz	2.5 to 4.9 oz	0.106 to 0.208	For use by licensed applicators in residential and commercial lawns, golf courses (excluding greens), sports fields, parks, recreational areas, roadsides, school grounds, and sod farms. Provides up to 60 days residual control. Use on bermudagrass, zoysiagrass, centipedegrass, and St Augustinegrass. Apply maximum 7.4 ounces per acre per season. Safe to use at high temperatures. Ryegrass can be overseeded 2 weeks after application. Apply 30 days prior to seeding bermudagrass or zoysiagrass. Wait 2 weeks after bermudagrass seedling emergence or sprigging operation before applying. For zoysiagrass, wait 3 weeks after seedling emergence before applying. A nonionic surfactant or methylated seed oil at 0.25% v/v is required for optimum control.
Postemergence Control or Suppression of Summer Weeds Such as Crabgrass Species, Goosegrass, Dallisgrass, Virginia Buttonweed, Doveweed, Florida Pusley, Nutsedge and Kyllinga Species; Winter Weeds Such as <i>poa annua</i>, <i>poa trivialis</i>, Tall Fescue, Henbit, Corn Speedwell, and Species of Ryegrass, Chickweed, and Clover				
[thiencarbazone-methyl + foramsulfuron + halosulfuron], MOA 14 + 2 + 2 (60.5 WG)	0.0735 oz	3.2 oz	0.121	Apply to well-established residential and commercial bermudagrass and zoysiagrass (Emerald, Meyer, Zeon) lawns, golf courses (excluding greens), athletic fields, sod farms, roadsides, parks, cemeteries and recreational areas. Do not exceed 3.2 ounces per acre per application or 6.4 ounces per acre yearly. Use 0.25 to 0.5% by volume nonionic surfactant or 0.5 to 1% by volume methylated seed oil. After application, wait 12 weeks to overseed ryegrass or bermudagrass. Wait 1 month after bermudagrass seedling emergence and 2 weeks after sprigging or sodding bermudagrass before treating. Temporary stunting and yellowing may last up to 2 weeks, but turf will recover. Crabgrass and goosegrass are controlled up to 2 tiller stage.
Postemergence Control, Goosegrass				
[(2,4-D + MCPP + dicamba + carfentrazone) + topramezone]	1.5 + 0.006 oz	4 pts + 0.25 oz	1.1 + 0.0005	Apply to established bermudagrass and emerged goosegrass. Will control mature goosegrass but better control obtained when applied to smaller goosegrass. Bermudagrass discoloration will occur and typically lasts less than 2 weeks. Mixing the products vastly reduces whitening on bermudagrass from topramezone. More discoloration will occur when temperatures are in excess of 85 degrees. Do not apply to putting greens.
foramsulfuron, MOA 2 (0.19 SC)	0.39 fl oz	17 fl oz	0.025	For use on bermudagrass and zoysiagrass grown on home lawns, golf courses and sod farms. See precautions listed under annual bluegrass section. For goosegrass control, apply 17 fl ounces per acre on plants up to 2 tillers followed by 17 fluid ounces per acre 2 weeks later.
metribuzin, MOA 5 (75 DF)	0.18 oz	8 oz	0.38	Apply to established bermudagrass and emerged goosegrass. Will control mature goosegrass but better control obtained when applied to smaller goosegrass. Irrigate in immediately with 0.25 inches of water. Do not apply to saturated soils or if significant rainfall is expected. Immediate irrigation increases efficacy and reduces bermudagrass discoloration. If watered in immediately, limited discoloration will occur. Do not apply to putting greens.
[metribuzin + topramezone]	.09 oz + 0.006 oz	4 oz + 0.25 oz	0.19 + 0.005	Apply to established bermudagrass and emerged goosegrass. Will control mature goosegrass but better control obtained when applied to smaller goosegrass. Do not irrigate in. Some slight bermudagrass discoloration will occur but disappears in approximately 10 to 14 days. Mixing the products vastly reduces whitening on bermudagrass from topramezone. Do not apply to putting greens.
sulfentrazone, MOA 14 (4 SC)	0.275 fl oz	0.75 pt	0.375	May be applied to home lawns. For use on creeping bentgrass, tall and fine fescue, perennial ryegrass, Kentucky bluegrass, and all warm-season turf species except St. Augustinegrass. See precautions listed under purple and yellow nutsedge section. For goosegrass control, apply 0.75 pint per acre on plants up to 2 tillers.

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Table 7-14. Chemical Weed Control in Lawns and Turf

Herbicide and Formulation	Amount of Formulation Per 1,000 sq ft	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Precautions and Remarks
Postemergence Control, Sedge and Various Broadleaf Weeds				
[sulfentrazone + imazaquin]	0.5 to 1 oz	22 to 44 oz	0.38 to 0.75	Use on established bermudagrass (common and hybrid), centipedegrass, St. Augustinegrass, and zoysiagrass. Do not use on putting greens. See label for further restrictions. Controls kyllinga, yellow and purple nutsedge, dandelion, henbit, lawn burweed, spurge, wild garlic, yellow woodsorrel. See label for additional weeds controlled. Addition of a nonionic surfactant at 0.25% volume/volume is required.
Postemergence Control, Bahiagrass, Crabgrass, Dallisgrass, Goosegrass, Nutsedge, Annual Sedges, Sandbur				
MSMA, MOA 17 (6 SL, 6.6 SL)		several concentrations	1.82 to 4.5	MSMA is only registered for golf course, sod farm, and highway right-of-way use. Bermudagrass, bluegrass and zoysiagrass are tolerant. Injury may result on bentgrass, fescue and also St. Augustinegrass grown for commercial sod production only. Do not use on carpetgrass or centipedegrass. MSMA restrictions: For existing golf courses, spot treat (100 square feet per spot) not to exceed 25% of total acreage. For new courses, make 1 broadcast application per year. For sod farms, make 1 to 2 broadcast applications per year and maintain 25 feet buffer around permanent water bodies. For highway rights of way, make 2 broadcast applications and maintain 100 feet buffer around permanent water bodies.
Postemergence Control, Crabgrass, Goosegrass, Sandbur, Dallisgrass				
MSMA, MOA 17 (6 SL, 6.6 SL)		several concentrations	1.5 to 2	See remarks for MSMA and metribuzin. The combination improves goosegrass control. Should be applied to bermudagrass only.
+ metribuzin, MOA 5 (75 DF)		+ 0.17 to 0.33 lb	+ 0.125 to 0.25	
Postemergence Control, Crabgrass, Goosegrass, Sandbur				
asulam, MOA 18 (3.34 SL)	1.8 fl oz	5 pt	2	Use only on St. Augustinegrass and Tifway 419 turf. On golf courses, use only on fairways and roughs.
Postemergence Control, Crabgrass and Foxtail Species, Goosegrass, Broadleaf Signalgrass, Japanese Stiltgrass				
Postemergence Suppression, Creeping Bentgrass, Common Bermudagrass, Dallisgrass, Nimblewill				
topramezone, MOA 27 (2.8 L)	0.023 to 0.034 fl oz	1 to 1.5 fl oz	0.021875 to 0.0328125	Labeled for broadcast treatment use in residential and athletic field turf, as well as in nonresidential turf sites including sod farms, golf courses (excluding greens and collars), parks, roadsides, cemeteries, and commercial properties. Tolerant turf species include Kentucky bluegrass, tall and fine fescue, perennial ryegrass, and centipedegrass at seeding and then anytime beyond 28 days after seeding. Add crop oil concentrate or methylated seed oil for enhanced control at 0.5 to 1% by volume. Don't apply greater than 2 fluid ounces per acre per application or 4 fluid ounces per acre per year. Bleaching intensity of susceptible weeds reduced, and broadleaf weed spectrum increased if tankmixed with quinclorac, [quinclorac + mecoprop + dicamba] or triclopyr. For suppression of above-listed weeds, add triclopyr at 1 pound ae per acre and make either 2 or 3 applications at 3 to 4 week intervals depending on topramezone rate. Creeping bentgrass is marginally tolerant to topramezone at 0.25 fluid ounces per acre. Test on a small area before large-scale use. Sequential applications may be required to achieve desired level of weed control.
Postemergence Control, Yellow Nutsedge, Annual Sedge				
bentazon, MOA 6 (4 SL)	0.75 to 1.5 fl oz	1 to 2 qt	1 to 2	For control of yellow nutsedge in established bluegrass, fescues, bentgrass, ryegrass, bermudagrass, bahiagrass, St. Augustinegrass, centipedegrass, and zoysiagrass. Apply to yellow nutsedge when actively growing under good soil moisture conditions. Additional applications may be made at intervals of 10 to 14 days until nutsedge is controlled.
Postemergence Control, Purple and Yellow Nutsedge, Kyllinga Species				
flazasulfuron, MOA 2 (25 DG)	0.034 to 0.069 oz	1.5 to 3 oz	0.023 to 0.0469	For use on well-established bermudagrass, zoysiagrass, centipedegrass and seashore paspalum grown on nonresidential turf including golf course fairways, roughs and tees, and industrial parks, tank-sod- and seed farms, cemeteries, athletic field and commercial lawns. Apply a maximum of 1.5 ounces per acre on fully green centipedegrass and seashore paspalum. 3 ounces per acre needed for perennial nutsedge and some annual sedge species control. Repeat applications in 2 to 6 weeks when nutsedge or sedge growth is evident. 1.5 to 2.25 ounces per acre will control kyllinga species. Maintain a 25 feet nontreated border beside susceptible turf species. Can overseed in 2 weeks if applied up to 1.5 ounces per acre. Wait 4 weeks if applied more than 1.5 ounces per acre. Include a nonionic surfactant at 0.25% by volume.
imazaquin, MOA 2 (70 DG)	0.128 to 0.256 oz	0.357 to 0.714 lb	0.25 to 0.5	Use on bermudagrass, centipedegrass, St. Augustinegrass, and zoysiagrass. Do not apply during spring greenup. Temporary yellowing may occur. Add a nonionic surfactant at 2 pt per 100 gal of spray solution. Addition of MSMA at 1.5 lb active per acre will improve sedge control in MSMA tolerant turfgrasses.
imazosulfuron, MOA 2 (75 WG)	0.184 to 0.322 oz	8 to 14 oz	0.38 to 0.66	May be applied to established (two mowings) residential and commercial bermudagrass, zoysiagrass, centipedegrass, St. Augustinegrass, creeping bentgrass, Kentucky bluegrass, perennial ryegrass, tall fescue, and fine fescue. Do not apply to putting greens. Reapply 3 weeks after initial application when using the 8 ounces per acre rate. Reapply as needed 3 weeks after initial application when using rates above 8 ounces per acre. Wait 4 weeks to seed or sod after application. Use an 80% active nonionic surfactant at 0.25% by volume. For spot treatment, add 0.25 to 0.33 oz in 1 to 2 gallons of water per 1000 square feet. Add 2 teaspoons nonionic surfactant per gallon.
halosulfuron, MOA 2 (75 WDG)	0.9 g	0.67 to 1.33 oz	0.031 to 0.062	May be applied to established residential and commercial bermudagrass, bahiagrass, zoysiagrass, centipedegrass, St. Augustinegrass, creeping bentgrass, Kentucky bluegrass, perennial ryegrass, tall fescue, and fine fescue. Apply broadcast when sedges have reached the 3- to 8-leaf stage. Use lower rate for light infestations and higher rate for heavy infestations. A second treatment will usually be required 6 to 10 weeks after the initial treatment. Use an 80% active nonionic surfactant at 2 quarts per 100 gallons of spray solution (0.5% by volume). Do not exceed 1 to 2 pints of surfactant per acre. Do not apply to putting greens. Halosulfuron only suppresses green kyllinga.

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Herbicide and Formulation	Amount of Formulation Per 1,000 sq ft	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Precautions and Remarks
Postemergence Control, Purple and Yellow Nutsedge, Kyllinga Species (continued)				
MSMA, MOA 17 (6 SL, 6.6 SL)		several concentrations	2 to 3	See remarks for MSMA above. Will require at least 2 applications 7 to 10 days apart.
sulfosulfuron, MOA 2 (75 DG)	0.017 to 0.029 oz	0.75 to 1.25 oz	0.035 to 0.059	May be applied to certain ornamental native grasses and also bermudagrass species, zoysiagrass, centipedegrass, St. Augustinegrass, and kikuyugrass grown on sod farms, golf courses (excluding greens), commercial and residential turf that is highly managed, and other noncrop areas. Use 0.75 to 1.25 ounces per acre, and repeat in 4 to 10 weeks if needed. Use a nonionic surfactant at 0.25% by volume.
trifloxysulfuron, MOA 2 (75 WG)	0.0023 to 0.0129 oz	0.1 to 0.56 oz	0.0047 to 0.0263	May be applied to residential bermudagrass and zoysiagrass and on golf courses, sod farms, and other nonresidential turf areas. A nonionic surfactant at 0.25 to 0.5% by volume is recommended. Temporary discoloration may occur if used with MSO or COC. Use rates of 0.33 to 0.56 ounces per acre for sedge and kyllinga species control. Labeled turf species can be seeded or sprigged into treated areas 4 weeks after application. Repeat application may be needed in 4 to 6 weeks.
Postemergence Control, Purple and Yellow Nutsedge, Kyllinga Species, and various broadleaf weeds				
sulfentrazone, MOA 14 (4 SC)	0.092 to 0.275 fl oz	0.25 to 0.75 pt	0.125 to 0.375	May be applied to home lawns. For use on creeping bentgrass, tall and fine fescue, perennial ryegrass, Kentucky bluegrass, and all warm-season turf species except St. Augustinegrass. Wait 3 months to seed, overseed, or sprig unless overseeding bermudagrass with perennial ryegrass, which only requires a 4- to 6-week waiting period after application. Apply to seedling grasses after second mowing and to new sod 6 months after establishment.
[sulfentrazone + imazethapyr], MOA 14 + 2 (4 SC)	0.22 to 0.33 fl oz	9.5 to 14.4 fl oz	0.29 to 0.45	May be applied to home lawns, athletic fields, sod farms, golf course fairways and roughs, and various non-crop sites. For use on bahiagrass, bermudagrass, centipedegrass, and zoysiagrass. Do not apply to soils classified as sand with less than 1% organic matter. Do not reseed, overseed, or sprig within 1 month of application. Expect slight perennial ryegrass injury if overseeded 2 to 4 weeks after application. Allow 3 month sod establishment before treatment.
[sulfentrazone + metsulfuron], MOA 14 + 2 (66 WG)	0.075 to 0.23 oz	3.25 to 10 oz	0.134 to 0.413	May be applied to established residential, commercial and institutional lawns, athletic fields, sod farms, and golf course fairways and roughs. Use up to 6.5 ounces per acre on Kentucky bluegrass and tall fescue and 10 ounces per acre on bermudagrass, centipedegrass, St. Augustinegrass and zoysiagrass. Do not reseed, overseed, or sprig within 1 month of application. Expect slight perennial ryegrass injury if overseeded 6 to 8 weeks after application. Allow 3 months sod establishment before treatment. No adjuvant needed.
Postemergence Control, Bahiagrass, Crabgrass, Yellow and Purple Nutsedge, Annual Sedge, Kyllinga Species				
imazapic, MOA 2 (2 AS)	0.092 to 0.184 fl oz	4 to 8 fl oz	0.063 to 0.125	For use on unimproved centipedegrass after complete greenup only. Not for use in home lawns. Do not use on other turfgrass species. A repeat application may be needed on tough to control perennial weeds such as bahiagrass. The highest labeled rate may discolor centipedegrass by causing a red color.
Postemergence Control, Dandelion, Carpetweed, Carolina Cranesbill, Curly Dock, Plantain, Dichondra, Shepherds-Purse, Yellow Rocket				
2,4-D amine, MOA 4 (4 SL)	3 to 4 tsp	1.5 to 2 pt	0.75 to 1	Cut rate one-half for bentgrass, carpetgrass, centipedegrass, and St. Augustinegrass. Spray when weeds are young and actively growing. To reduce danger of injury to flowers and ornamentals by spray drift, use low pressure and do not spray on windy days.
Postemergence Control, Common Chickweed, Mouseear Chickweed, Creeping Charlie or Ground Ivy, Dandelion, Lespedeza, Black Medic, Spotted Spurge, Hop or White Clover				
mecoprop, MOA 4 (1.9 L) (1.16 L) (1.74 L)	1 to 1.5 fl oz 1.5 to 2.25 fl oz 0.75 to 1.5 fl oz	2.7 to 4 pt 4 to 6 pt 2 to 4 pt	0.64 to 0.95 0.58 to 0.87 0.43 to 0.87	Observe same precaution as for 2,4-D. May be used on bentgrass, carpetgrass, centipedegrass, St. Augustinegrass, and other turf grasses.
Postemergence Control, Chickweed, White Clover, Dandelion, Curly Dock, Hawkweed, Henbit, Knotweed, Red Sorrel, Knawel, Spurweed, Spotted Spurge, Wild Strawberry, Yarrow				
dicamba, MOA 4 (4 SL)	1 to 2 tsp	0.5 to 1 pt	0.25 to 0.5	Apply as foliar spray to growing weeds. Prevent injury to ornamentals. Avoid rooting zone of shallow-rooted trees and shrubs.
diglycolamine, MOA 4 (4 SL)	1 to 4.5 tsp	0.5 to 2 pt	0.25 to 1	Do not exceed 1 pint per acre on bentgrass, carpetgrass, buffalograss, and St. Augustinegrass. Apply to newly seeded grasses after the second mowing. Do not exceed 0.25 pint per acre on extended sensitive plant roots on sandy soils and 0.5 pint per acre on clay soils.
Postemergence Control, All Weeds Listed Under 2,4-D Amine, MCPP, Dicamba, and Diglycolamine Sections				
[2,4-D amine + MCPP + dicamba], MOA 4 + 4 + 4 (various formulations)	See individual label	See individual label	See individual label	Check individual labels for specific rates, instructions and precautions. Generally, 1) apply to grass seedlings after second mowing; 2) apply to sodded, sprigged, or plugged turf 3 to 4 weeks after operations; and 3) wait 3 to 4 weeks after application to seed. Many products labeled for tall fescue, perennial ryegrass, perennial bluegrass, bermudagrass, and St. Augustinegrass. Some products labeled for bentgrass putting greens, bahiagrass, zoysiagrass, and centipedegrass. Some products labeled for home use when applied by a commercial applicator.
[2,4-D amine + MCPP + dichlorprop], MOA 4 + 4 + 4 (4.11 L) (2.48 L)	0.62 to 1.47 fl oz 0.64 to 1.47 fl oz	1.7 to 4 pt 1.75 to 4 pt	0.873 to 2.06 0.543 to 1.24	
[MCPA + MCPP + dicamba], MOA 4+4+4 (4 L)	0.7 to 1.5 fl oz	2.5 to 4.1 pt	1.25 to 2.05	
Postemergence Control, Curly Dock, Broadleaf Dock, Galinsoga, Nightshade, Clover (Red, Hop, White, Sweet), Goldenrod, Musk Thistle, Speedwells, Common Vetch, Hairy Buttercup, Broadleaf Plantain				
clopyralid, MOA 4 (3 EC)	0.1 to 0.5 fl oz	0.25 to 1.33 pt	0.09 to 0.5	Do not apply to home lawns. May be used on bentgrass, Kentucky bluegrass, creeping red, chewings, sheep and tall fescue, perennial ryegrass, bermudagrass, bahiagrass, buffalograss, centipedegrass, zoysiagrass, and St. Augustinegrass. Do not apply to putting greens and tees. Should be applied in a minimum of 20 gallons of water per acre. Surfactants are not necessary. Do not apply to exposed roots of certain trees and shrubs (legumes such as acacia, locust, mimosa, redbud, or mesquite) or <i>Tilia</i> spp. Do not use treated clippings for mulching and compost during the growing season of application.

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Table 7-14. Chemical Weed Control in Lawns and Turf

Herbicide and Formulation	Amount of Formulation Per 1,000 sq ft	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Precautions and Remarks
All Weeds Listed Under 2,4-D Amine, Clopyralid, Dicamba, and Diglycolamine Sections				
[2,4-D amine + clopyralid + dicamba], MOA 4 + 4 + 4 (3.56 L)	0.55 to 1.1 fl oz	1.5 to 3 pt	0.67 to 1.34	Do not apply to home lawns. Use on perennial bluegrass, ryegrass, and fescue species, bentgrass (excluding greens and tees), bermudagrass, zoysiagrass, and bahiagrass. Do not apply to seedling grasses until well established. Wait 3 to 4 weeks after application to seed.
Postemergence Control, Virginia Buttonweed, Chickweed Species, White Clover, Dandelion, Henbit, Ground Ivy, Prostrate Knotweed, Matchweed, Black Medic, Plantain Species, Common Woodsorrel				
[2,4-D amine + fluroxypyr + dicamba], MOA 4 + 4 + 4 (4 SL)	0.36 to 1.1 fl oz	1 to 3 pt	0.5 to 1.5	Use on perennial bluegrass and ryegrass, tall fescue, creeping bentgrass (excluding greens and tees), bermudagrass species, bahiagrass, zoysiagrass, and St. Augustinegrass in residential, industrial, and institutional lawns, parks, cemeteries, athletic fields, golf courses, and sod farms. Use on St. Augustinegrass sod farms only. Apply 1 to 2 pints per acre on creeping bentgrass and 1.5 to 1.8 pints per acre on warm season turf grown for sod. Apply 2 to 3 pints per acre to all other turf areas. For non-turf areas, rate can be increased to 2 to 5 pints per acre. Application can be made to grass seedlings after second mowing and to newly sodded, sprigged, or plugged grasses 3 to 4 weeks after operations.
[MCPA amine + fluroxypyr ester + dicamba], MOA 4 + 4 + 4 (4.8 SL)	0.73 to 1.1 fl oz	2 to 3 pt	1.2 to 1.8	Same turf tolerances and uses as [2,4-D amine + fluroxypyr + dicamba] in addition to centipedegrass. Only spot treat St. Augustinegrass when temperature exceeds 80°F. Do not apply more than two applications per year totaling 3 pints per acre. For non-turf areas, rate can be increased to 2 to 5 pints per acre. Application can be made to grass seedlings after second mowing and to newly sodded, sprigged, or plugged grasses 3 to 4 weeks after operations. Sod farm rates include 1.25 pints per acre for creeping bentgrass, 2 to 3 pints per acre for all other cool season grasses listed on label and 1.5 to 1.8 pints per acre for all warm season grasses listed on label.
Postemergence Control, Winter and Summer Annual Broadleaf Weeds				
bentazon + atrazine, MOA 6 + 5 Create by tank mixing			0.5 to 0.75 + 0.5 to 0.75	Apply to bermudagrass, centipedegrass, St. Augustinegrass, and zoysiagrass. Check individual labels for weeds controlled and weed size for proper application.
2,4-D (choline salt) + Fluroxypyr + halauxifen methyl (3.28 L)	1.1 to 1.47 oz	48 to 64 oz	1.23 to 1.64	For postemergence control of annual and perennial broadleaf weeds in established turfgrass and ornamental grasses in golf courses, industrial sites, cemeteries, commercial sod farms, and unimproved turfgrass areas. Not for use in residential turfgrasses. Can be used on bentgrass, Kentucky bluegrass, fescues (chewing, creeping red, sheeps, tall, and hard) perennial ryegrass, bermudagrass, and zoysiagrass. Do not use on turf mowed at less than 0.5 inches. Repeat applications can be made at 4-week intervals. For a complete list of weeds controlled and additional precautions, consult GameOn herbicide label.
Postemergence Control, Black Medic, White, Hop Clover, Buckhorn Plantain, Common Chickweed, Mouseear Chickweed, Henbit, Spurweed (Lawn Burweed), Broadleaf Plantain, Dandelion, False Dandelion, Lespedeza, Prostrate Spurge, Wild Violet				
[triclopyr + clopyralid], MOA 4 + 4 (3 SL)	0.37 to 0.74 fl oz	1 to 2 pt	0.28 to 0.56 + 0.09 to 0.19	Do not apply to home lawns. May be used on centipedegrass, bermudagrass, zoysiagrass, tall fescue, creeping red fescue, chewing fescue, Kentucky bluegrass, perennial ryegrass. Repeat treatment may be necessary for prostrate spurge and wild violet. Quali-Pro formulation: maintain 0.5 inch height for warm season turf. Do not apply to bermudagrass sod farms. Wait 3 weeks to reseed. Do not use grass clippings for compost or mulch.
[MCPA ester + triclopyr ester + dicamba], MOA 4 + 4 + 4 (3.6 EC)	0.91 to 1.29 fl oz	2.5 to 3.5 pt	1.125 to 1.575	May be applied to home lawns by a commercial applicator. Not for use on turf grown for resale or other commercial use as sod or seed production. Use on perennial bluegrass, ryegrass, fescue species, bentgrass (excluding greens and tees), bermudagrass, zoysiagrass, and bahiagrass. Do not apply to seedling grasses until well established. Wait 3 to 4 weeks after application to seed.
[MCPA amine + triclopyr amine + dicamba], MOA 4 + 4 + 4 (4.56 L)	0.73 to 1.1 fl oz	2 to 3 pt	1.14 to 1.71	
[MCPA amine + fluroxypyr ester + triclopyr amine], MOA 4+4+4 (3.41 L)	0.37 to 1.47 fl oz	1 to 4 pt	0.42625 to 1.705	Apply by a commercial applicator to residential, industrial, and institutional lawns, sod farms, parks, cemeteries, athletic fields, roadsides, and golf courses excluding greens and tees. May apply to bentgrass, Kentucky bluegrass, perennial ryegrass, fescue species, bahiagrass, bermudagrass, centipedegrass, and zoysiagrass. Do not spray on warm season turf less than 0.5 inch and do not exceed 3 pints per acre. Generally apply 3 to 4 pints per acre except on fairway bentgrass, which can only tolerate 2 pints per acre. Wait 3 to 4 weeks after application to reseed. Check label for spray adjuvant recommendation.
Postemergence Control, Plantain, Chickweed, Dandelion, Purslane, and Thistle Species, Ground Ivy, Lawn Burweed, Henbit, Corn Speedwell, Spotted Spurge				
carfentrazone-ethyl, MOA 14 (1.9 EW)	0.0126 to 0.048 fl oz	0.55 to 2.1 fl oz	0.008 to 0.031	May be applied to bahiagrass, bermudagrass, buffalograss, centipedegrass, St. Augustinegrass, zoysiagrass, Kentucky bluegrass, tall fescue, fine fescue, perennial ryegrass, and bentgrass. To expand the weed spectrum and extend control of the weeds listed here and, on the label, carfentrazone-ethyl can be tank mixed with the entire range of phenoxy products—amines, esters, and other salts—and is also compatible with dicamba, atrazine, glyphosate, glufosinate, clopyralid, triclopyr, and MSMA. When applied alone, add 0.12 to 0.25% nonionic surfactant.
Postemergence Control, White Clover, Dandelion, Ground Ivy, Spurge, Plantains, Chickweeds, Henbit, Lawn Burweed, Woodsorrels, Dollarweed, Poison Ivy, Poison Oak, Corn Speedwell, Wild Strawberry, Wild Violet, Virginia Pepperweed, Shepherd's Purse				
[carfentrazone + 2,4-D ester + MCPP + dicamba], MOA 14 + 4 + 4 + 4 (2.2 EC)	0.75 to 1.8 fl oz	2 to 5 pt	0.55 to 1.375	May be used on annual and perennial bluegrass, annual and perennial ryegrass, tall and fine fescue, creeping and colonial bentgrass, common and hybrid bermudagrass, and zoysiagrass. For use in ornamental turf, golf courses, lawns, sod farms, cemeteries, and parks. Optimum results when applied when temperatures are between 45°F and 75°F but may be applied up to 90°F. Lower rates may be used in cooler weather. Rainfast within 3 hr and may reseed after 2 weeks. May apply 3 to 4 wks after sodding, sprigging, or plugging. Also may be used on bahiagrass, buffalograss, St. Augustinegrass, centipedegrass, seashore paspalum, and kikuyugrass. May reseed after 1 week.
[carfentrazone + 2,4-D ester + MCPP + dicamba], MOA 14 + 4 + 4 + 4 (0.81 EC)	0.55 to 2.2 fl oz	1.5 to 6 pt	0.1519 to 0.6075	
[carfentrazone + MCPA ester + MCPP + dicamba], MOA 14 + 4 + 4 + 4 (2.91 EC)	0.75 to 2.2 fl oz	2 to 6 pt	0.7275 to 2.1825	Same precautions and turf uses as [carfentrazone + 2,4-D ester + MCPP + dicamba] 2.2 EC except cannot be applied to creeping and colonial bentgrass.

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Table 7-14. Chemical Weed Control in Lawns and Turf

Herbicide and Formulation	Amount of Formulation Per 1,000 sq ft	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Precautions and Remarks
Postemergence Control, White Clover, Dandelion, Ground Ivy, Spurge, Plantain, Chickweed, Henbit, Lawn Burweed, Woodsorrels, Dollarweed, Poison Ivy, Poison Oak, Corn Speedwell, Wild Strawberry, Wild Violet, Virginia Pepperweed, Shepherd's Purse (continued)				
penoxsulam + sulfentrazone + 2,4-D + dicamba	1.0 to 2.2 fl oz	2.7 to 6 pt	0.271 to 0.602	May be used on established Kentucky bluegrass, annual bluegrass, perennial ryegrass, annual ryegrass, tall fescue, common and hybrid bermudagrass, zoysiagrass, centipedegrass, and seashore paspalum. Do not apply more than 2.7 pints per acre on fescue or perennial ryegrass unless turf injury can be tolerated. Do not apply more than 3.5 pints per acre on St. Augustinegrass unless injury, discoloration, stunting, and thinning can be tolerated.
[sulfentrazone + 2,4-D amine + MCPP + dicamba], MOA 14 + 4 + 4 + 4 (2.18 SL)	0.92 to 1.84 fl oz	2.5 to 5 pt	0.68 to 1.36	Apply 2.5 to 3.25 pints per acre on warm season turf including bermudagrass species, zoysiagrass, bahiagrass, and buffalograss. Apply 3.25 to 4 pints per acre on cool season turf including species of bluegrass, ryegrass, fescue, and bentgrass (excluding greens and tees). 4 to 5 pints per acre needed to control corn speedwell and wild violet. Turf areas include residential, ornamental, institutional, and sod farms. Apply to grass seedlings after second mowing. Apply to sodded, sprigged, or plugged areas 3 to 4 weeks after operations. Treated areas may be reseeded 3 weeks after application.
[triclopyr ester + sulfentrazone + 2,4-D ester + dicamba], MOA 4 + 14 + 4 + 4 (2.51 EC)	0.75 to 1.5 fl oz	2 to 4 pt	0.628 to 1.26	Apply 2 to 2.25 pints per acre on fully dormant bermudagrass, zoysiagrass, and bahiagrass. Apply 3.25 to 4 pints per acre on annual and perennial bluegrass and ryegrass, and tall, red, and fine fescue. Rainfast within 3 hours. Approved turf areas include residential, ornamental, institutional, noncropland, and sod farms. Apply to grass seedlings after the second or third mowing. Apply to sodded, sprigged, or plugged areas 3 to 4 weeks after operations. Treated areas may be reseeded 3 weeks after application.
Postemergence Control, Chickweed, Clover, Plantain and Dandelion Species, Florida Betony, Dollarweed, Ground Ivy, Lespedeza, and Yellow Woodsorrel				
florasulam, MOA 2 (0.42 SC)	0.09 fl oz	4 fl oz	0.013125	Can be used on all established major warm and cool season turfgrass species in residential lawns, golf courses (excluding putting greens), sports fields, sod farms and commercial turf areas. Controls Carolina geranium, species of chickweed, clover and dandelion, vetch, dollarweed and common groundsel. Do not exceed 3 applications or 12 fluid ounces per acre per year. Apply to newly seeded or sprigged turf after third mowing or when tillering and secondary root development has occurred. Wait 4 weeks to reseed. When used alone, add a nonionic surfactant at 0.2% by volume.
penoxsulam, MOA 2 (0.014 G) (0.03 G)	3.4 to 10.3 lb 1.7 to 4.6 lb	150 to 450 lb 75 to 200 lb	0.02 to 0.06	May be applied to residential and commercial lawns, golf courses (excluding greens and tees), parks, athletic fields, and sod farms. Use on turf that has been mowed at least 3 times or sprigs that have developed secondary root systems. Apply up to 75 pounds per acre of 0.03 G or 150 pounds per acre of 0.014 G to perennial ryegrass and tall fescue. Apply up to 150 pounds per acre of 0.03 G or 300 pounds per acre of 0.014 G to bentgrass, Kentucky bluegrass, and fine fescue. Apply up to 200 pounds per acre of 0.03 G or 450 pounds per acre of 0.014 G to bermudagrass, centipedegrass, zoysiagrass, and St. Augustinegrass. Do not apply to dormant centipedegrass. Reapply at 4 weeks if needed but do not exceed 300 pounds per acre of 0.03 G or 650 pounds per acre of 0.014 G per season. After treatment, wait 3 to 4 weeks to reseed.
(0.31 L)	0.092 to 0.55 fl oz	0.25 to 1.5 pt	0.01 to 0.058	Same statement as above concerning turf uses and reseeding intervals. Bermudagrass and kikuyugrass are the only warm season grasses labeled for use. Apply up to 1 pint per acre on bentgrass, 1.5 pint per acre on bermudagrass and kikuyugrass and 2 pints per acre on tall fescue and perennial ryegrass. Do not apply greater than 2.3 pints per acre per year. Surfactant not required.
Carpetweed, Chickweed, Dandelion, Curly Dock, Cutleaf Eveningprimrose, Henbit, Knotweed, Common Mallow, Poison Ivy, and Annual Sowthistle				
pyraflufen ethyl, MOA 14 (0.177 SC)	0.016 to 0.092 fl oz	0.7 to 4 fl oz	0.000938 to 0.0055	Used in established sod farm and ornamental turf by commercial applicators and professional landscapers only. Turf can be newly seeded, sodded, or sprigged as long as it is established and not under stress. Tolerant turfgrasses include bermudagrass, centipedegrass, St. Augustinegrass, zoysiagrass, tall fescue, perennial ryegrass, perennial bluegrass, and creeping bentgrass (not greens or tees). Apply 1 to 4 fluid ounces alone to 3- to 6-inch tall weeds. For larger weeds and broader spectrum control, apply 0.75 to 1.5 fluid ounces and tank mix with 2,4-D, mecoprop, dicamba, chloroprop, MCPA, triclopyr, or fluroxypyr.
Postemergence Control, Bahiagrass, Perennial Ryegrass, Wild Garlic, Spurweed, Henbit, Miscellaneous Other Broadleaf Weeds				
metsulfuron, MOA 2 (60 WDG)	0.003 to 0.02 oz	0.125 to 1 oz	0.005 to 0.038	May be applied to established bermudagrass, zoysiagrass (Meyer or Emerald), St. Augustinegrass, Kentucky bluegrass or fine fescue. Do not apply to turf less than 1 year old. Do not exceed 0.5 ounces per acre on centipedegrass, fine fescue, or Kentucky bluegrass. See label for a complete list of weeds controlled. The addition of 0.25% nonionic surfactant will enhance control. May be used for removal of perennial ryegrass from overseeded warm-season turf species. For bahiagrass control, use 0.25 to 0.75 ounces per acre after spring greenup but before seedhead development. A repeat treatment may be necessary in 4 to 6 weeks.
metsulfuron (Patriot) 60 WDG	0.007 to 0.046 oz	0.33 to 2 oz	0.012 to 0.075	Apply to unimproved industrial turf only. Use maximum of 0.5 ounce per acre for fescue and bluegrass and 2 ounces per acre for bermudagrass.
[metsulfuron + rimsulfuron], MOA 2 + 2 (37 WG)	0.0344352 oz	1.5 oz	0.0346875	See comments under postemergence annual bluegrass control. For bahiagrass control, a repeat treatment may be necessary 4 to 6 weeks after initial application.
Postemergence Control, Wild Garlic, Wild Onion				
imazaquin, MOA 2 (70 DG)	0.128 to 0.256 oz	0.357 to 0.714 lb	0.25 to 0.5	Use on bermudagrass, centipedegrass, St. Augustinegrass, and zoysiagrass. Do not apply during spring greenup. Temporary yellowing may occur. Add a nonionic surfactant at 2 pints per 100 gallons of spray solution.
2,4-D amine, MOA 4 (4 SL)	2.2 fl oz	3 qt	3	Apply in fall when garlic is young and actively growing. Add a wetting agent to keep spray from bouncing off garlic leaves. Repeat treatment for 2 years. Avoid spray drift which can injure susceptible plants. Use on bluegrass, fescue, bermudagrass, or zoysia. For more susceptible grasses, use spot treatment below.
	Spot treatment			One tbsp of 1% 2,4-D solution per garlic clump or use pressurized applicator. Apply December to April. Use as spot treatment for widely scattered clumps in small areas. Avoid excessive spraying as turfgrass injury may result.

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Table 7-14. Chemical Weed Control in Lawns and Turf

Herbicide and Formulation	Amount of Formulation Per 1,000 sq ft	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Precautions and Remarks
Postemergence Control of Various Grass and Broadleaf Weeds in Unimproved Turf and Other Noncrop Areas				
glyphosate, MOA 9 (5.5 SL) (5 SL) (4 SL)	0.14 to 1.01 0.12 to 0.87 fl oz 0.75 to 2.94 fl oz	0.375 to 2.75 pt 0.3125 to 2.375 pt 1 to 4 qt	0.26 to 1.89 0.2 to 1.48 0.5 to 4	Check specific labels for correct rates. Apply to dormant or actively growing well established bermudagrass and bahiagrass. Bahiagrass growth will be suppressed if treated after spring greenup and before seedhead formation. Treat winter annual weeds when less than 6 inches tall. Higher rates are needed for more mature plants. Apply in 10 to 40 gallons of water per acre and use an NIS at 2 quarts per 100 gallons of spray solution.
[glyphosate + 2,4-D amine], MOA 9 + 4 (1.2 + 1.9 lb/gal SL)	0.55 to 1.47 fl oz	1.5 to 4 pt	0.58 to 1.55	Apply in 15 to 30 gallons of water per acre. May be applied to highly maintained dormant bermudagrass at 2 to 4 pt per acre. In low maintenance bermudagrass, sulfometuron can be added at 0.25 to 1 ounce per acre when dormant or actively growing. Apply 2 to 4 pints per acre on dormant bahiagrass and 1.5 to 2 pints per acre on actively growing bahiagrass. Tank mix with sulfometuron if needed. Check label for sulfometuron rates. Tall fescue applications can be made in the spring or summer at 2 to 3 pints per acre with or without sulfometuron. Spray tall fescue at 4 to 6 inches tall and before seedhead emergence to minimize injury.
sulfosulfuron, MOA 2 (75 WG)	0.017 to 0.046 oz	0.75 to 2 oz	0.035 to 0.094	May be used in well-established dormant and actively growing bermudagrass and bahiagrass. Wait 30 days to re-treat if needed; do not exceed 2.66 ounces per acre per year. If treating weeds postemergence, use an NIS at 2 quarts per 100 gallons spray solution unless tank mixed with glyphosate. Sulfosulfuron can be tank mixed with [glyphosate + 2,4-D amine], metsulfuron, sulfometuron, and chlorsulfuron, but check label for proper turf species and timing. Expect temporary injury or discoloration with tank mix partners. For well-established tall fescue, do not exceed 1 ounce per acre per year, and do not tank mix. Effective on johnsongrass.
[thiencarbazone-methyl + iodosulfuron-methyl + foramsulfuron], MOA 14 + 2 + 2 (36.4 WDG)	0.069 to 0.138 oz	3 to 6 oz	0.068 to 0.137	May be applied to unimproved bermudagrass, zoysiagrass, centipedegrass and bare ground sites on private, public and military land for control of many annual and perennial broadleaf and grass weeds. Check label for complete weed listing, rate needed and recommended adjuvant. Repeat application in 4 to 6 weeks if weed regrowth occurs not to exceed 6 ounces product per year. Spot treatment (spray-to-wet) rate is 3 to 6 ounces product per 25- to 100-gallon solution. Nonionic surfactant is generally recommended at 0.25 to 0.5%. Use 0.5 to 1% methylated seed oil for difficult to control broadleaf weeds and perennial grasses. Increased control may be achieved with 1.5 to 3 pounds per acre ammonium sulfate in high humidity climates or 1.5 to 2 quarts per acre urea ammonium nitrate in low humidity climates. Do not use an organosilicone surfactant.
Postemergence Control in Dormant Warm Season Turf Annual Bluegrass, Various Other Winter Annual Weeds				
diquat, MOA 22 (2 SL)	0.4 to 0.75 fl oz	1 to 2 pt	0.25 to 0.5	Apply in 20 to 100 gallons spray mix as a broadcast application. Add 1 to 2 pints of a nonionic surfactant per 100 gallons of solution. Bermudagrass must be dormant. More than one application may be needed.
flumioxazin, MOA 14 (51 WG)	0.1837 to 0.2755 oz	8 to 12 oz	0.255 to 0.3825	Use on completely dormant bermudagrass turf including residential and commercial lawns, golf courses (excluding greens), sod farms, roadsides, athletic fields, parks and schools. Add 0.25% by volume nonionic surfactant for postemergence applications. Provides preemergence control of annual grasses such as crabgrass, goosegrass, foxtail species, barnyardgrass and annual bluegrass. Does control annual bluegrass postemergence along with many common winter annual broadleaf weeds such as chickweed species, henbit, Carolina geranium and hairy bittercress. Allow a 15 foot buffer zone when applying upslope from bentgrass greens or bermudagrass greens overseeded with <i>Poa trivialis</i> . To limit potential lateral movement, do not apply to saturated soil.
glyphosate - Roundup, MOA 9 (4 SL) (5 SL) (5.5 SL)	0.37 fl oz 0.29 fl oz 0.27 fl oz	1 pt 0.8 pt 0.73 pt	0.5	Check specific labels for correct rates. Apply in 5 to 40 gallons water per acre with 0.5% by volume of a nonionic surfactant. Application to actively growing annual bluegrass must be made before initiation of bermudagrass greenup in the spring.
glyphosate - Touchdown, MOA 9 (3 LC) (4.17 LC) (5 LC)	0.18 to 1.47 fl oz 0.13 to 1.06 fl oz 0.11 to 0.88 fl oz	0.5 to 4 pt 0.36 to 2.88 pt 0.3 to 2.4 pt	0.1875 to 1.5	Apply to dormant bermudagrass and bahiagrass before spring greenup. Apply in 10 to 40 gallons water per acre. Will control winter annual weeds up to 6 inches tall and 4- to 6-leaf tall fescue. Use a 75% active ingredient nonionic surfactant at 0.25% by volume or dry ammonium sulfate at 0.5% by weight.
[glyphosate + diquat], MOA 9 + 22 (76 WG) (4.21 SL)	0.11 to 0.37 oz 0.18 to 0.62 fl oz	5 to 16 oz 8 to 27 fl oz	0.24 to 0.76 0.26 to 0.89	Apply to dormant bermudagrass and bahiagrass not grown for research, sale, or other commercial uses, such as sod, seed production. Apply in 10 to 80 gallons water per acre. Rates greater than 9 ounces per acre of 76 WG product or 15 fluid ounces per acre of 4.21 SL product may cause injury or delay greenup in highly maintained areas. Controls tall fescue.
metribuzin, MOA 5 (75 WDF)	0.25 oz	0.67 lb	0.5	For application by commercial applicators to dormant bermudagrass turf. Broadcast spray before greenup of turf. Do not apply to greens, tees, or aprons. Controls common chickweed, corn speedwell, henbit, parsley-piert, and spurweed.
Suppression/Control, Bermudagrass				
fenoxaprop, MOA 1 (0.57 EC)	0.46 fl oz	1.25 pt	0.089	Use on Kentucky bluegrass, perennial ryegrass, fine and tall fescue, and zoysiagrass. Apply June 1, July 1, Aug. 1, Sept. 1, repeat for 2 years. Can be tankmixed with 1 pt per acre triclopyr following the same schedule as above. Apply June 1 and Aug. 1 for 2 years if tank mixed with 1 quart per acre triclopyr. Zoysia may show discoloration but should recover in 10 to 14 days following tankmix applications.
fluazifop, MOA 1 (2 EC)	0.05 to 0.14 fl oz	2 to 6 fl oz	0.03 to 0.09	Use on tall fescue or zoysia. For fescue, apply 5 to 6 ounces per acre during warm weather in early spring when bermudagrass is breaking dormancy; repeat in fall when bermudagrass is preparing for dormancy. For zoysia, apply 4 ounces per acre on June 1, Aug. 1; repeat for 2 years. Can tank-mix with 1 quart per acre triclopyr following schedule above. Zoysia or tall fescue may show slight discoloration but should recover in 10 to 14 days. Add a nonionic surfactant at 0.25% v/v. Apply in a minimum of 30 gallons of water per acre.

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Herbicide and Formulation	Amount of Formulation Per 1,000 sq ft	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Precautions and Remarks
Suppression/Control, Bermudagrass (continued)				
siduron, MOA 7 (50 WP)	0.5 to 1 lb	21.78 to 43.56 lb	10.88 to 21.78	Apply as 8- to 12-inch band treatment with a single nozzle sprayer along putting green perimeter to suppress bermudagrass stolon encroachment. Initiate in March or April and continue subsequent applications at 4- to 5-week intervals.
triclopyr, MOA 4 (4 EC)	0.73 fl oz	1 qt	1.0	Use on perennial bluegrass, perennial ryegrass, tall fescue or ornamental turf including sod farms and golf courses. Do not apply to zoysia unless injury can be tolerated. Apply June 1, July 1, Aug. 1, Sept. 1, repeat for 2 years. Can be tank-mixed with fenoxaprop or fluazifop at rates, timings listed above. New low-odor formulation uses methylated seed oil solvents instead of petroleum distillates.
Postemergence Control Bermudagrass				
clethodim, MOA 1 (0.97 EC)	0.4 to 0.8 fl oz	17 to 34 fl oz	0.125 to 0.25	For use on sod farms only. Do not apply to centipedegrass being grown for seed. Do not apply until 3 weeks after full greenup of centipedegrass in spring. Do not mow for 1 week before and after application. The addition of a nonionic surfactant at 0.25 % solution (1 pint per 50 gallons water) or a crop oil concentrate at 1% solution (2 quarts per 50 gallons water) is necessary for control. A repeat application usually 3 to 4 weeks after the first application will be required for bermudagrass control. Use higher rates for more established bermudagrass. Do not apply more than 68 ounces of clethodim per acre per year. Some discoloration of centipedegrass will occur at higher rates.
Preplant Control or Lawn Renovation — Emerged Annual and Perennial Grass and Broadleaf Weeds				
glyphosate - Roundup, MOA 9 (4 SL) (5 SL) (5.5 SL)	0.75 to 3 fl oz 0.54 to 2.17 fl oz 0.54 to 2.14 fl oz	1 to 4 qt 0.8 to 3.2 qt 0.73 to 2.91 qt	1 to 4	Where existing vegetation is growing in a field or unmowed situation, apply to actively growing weeds at the stages according to label. Where existing vegetation is growing under mowed turfgrass management, apply after omitting at least one regular mowing to allow sufficient growth for good interception of the spray. Tillage or renovation techniques such as vertical mowing, coring, or slicing should be delayed for 7 days after application. Desirable turfgrass may be established following treatment.
glyphosate - Touchdown, MOA 9 (3 LC) (4.17 LC) (5 LC)	0.18 to 1.47 fl oz 0.13 to 1.06 fl oz 0.11 to 0.88 fl oz	0.5 to 4 pt 0.36 to 2.88 pt 0.3 to 2.4 pt	0.1875 to 1.5	Same remarks as glyphosate, above. In addition, use a 75% active ingredient nonionic surfactant at 0.25% by volume or dry ammonium sulfate at 0.5% by weight.
[glyphosate + diquat], MOA 9 + 22 (76 WG) (4.21 SL)	1.65 to 4.5 oz 2.75 to 5.5 fl oz	4.5 to 12.25 lb 3.75 to 7.5 qt	3.4 to 9.3 3.95 to 7.89	Generally use the 75 WG product at 4.5 pounds per acre on annuals, 9 pounds per acre on perennials, and 12.25 pounds per acre on dusty or stressed plants, dense stands, or difficult-to-control perennials. Generally use the 4.21 SL product at 3.75 quarts per acre on annuals and 7.5 quarts per acre on perennials. Do not use on turf grown for research, for sale, or for commercial uses, such as sod or seed production. Do not use if renovating bermudagrass or kikuyugrass sods. Delay tillage for 7 days after application.
[indaziflam + diquat dibromide + glyphosate], MOA 21 + 22 + 9 (1.958 SL)	1 pt	5.44 gal	10.66	For nonselective preemergence and postemergence control in noncrop areas. Reapply 4 months after initial application if needed not to exceed 1 quart per 1000 square feet per year. Apply 1 pint in 1 gallon of water to cover 1000 square feet. Do not seed for 12 months after application.
Trimming and Edging and Control of Emerged Weeds				
diquat, MOA 22 (2 SL)	0.4 to 0.75 fl oz	1 to 2 pt	0.25 to 0.5	Add nonionic surfactant at 0.25 ounce per gallon of water. Water volumes above 15 gal per acre should be used. For spot sprays, use 0.3 to 0.75 fluid ounce per gallon.
glufosinate, MOA 10 (1 SL)	2.2 to 4.4 fl oz	3 to 6 qt	0.75 to 1.5	Rate depends on weed to be controlled and stage of growth. Consult label. For spot or directed spray use 1.5 to 4 fluid ounces per gallon of water.
glyphosate + diquat, MOA 9 + 22 (76 WG) (4.21 SL)	1.65 to 4.5 oz 2.75 to 5.5 fl oz	4.5 to 12.25 lb 3.75 to 7.5 qt	3.4 to 9.3 3.95 to 7.89	May be used in general noncrop areas. Do not use on plants grown for sale or other commercial uses, such as seed production. See rate comments in lawn renovation section. For spray to wet treatments, apply the 76 WG product at 1.2 ounces per gal of water for annuals and 1.5 ounces per gal of water for perennials. Apply the 4.21 SL product at 2 fluid ounces per gallon of water for annuals and 2.5 fluid ounces per gal water for perennials. For directed spot treatment of perennials using hand-held low volume equipment, apply 4 to 8 ounces per gallon of water.