

WEED MANAGEMENT IN LAWNS

Integrated Pest Management for Home Gardeners and Landscape Professionals

Weeds occur in every lawn, but they seldom become problems in well-managed, vigorously growing turfgrass. Proper site preparation and turfgrass selection before planting are essential to give a new lawn a healthy start. Once a lawn is established, poor maintenance practices that weaken it—such as improper irrigation, fertilization, or mowing—are the primary factors likely to predispose it to weed invasion. Activities that lead to compaction also contribute significantly to turfgrass stress, making it easier for weeds to invade. An integrated weed management program can reduce most weed populations to tolerable levels and prevent large, unsightly weed patches. Total eradication of weeds is not a realistic or necessary goal for most lawns and park turfgrass; however, with good management practices a lawn can be practically weed-free without the extensive use of chemicals.

WEED IDENTIFICATION

Identifying weeds and knowing their life cycles are essential to management. Three general categories of weeds may be found in lawns: broadleaves, grasses, and sedges (Figs. 1, 2, and 3). Take care to distinguish weedy grasses from similar-looking lawn grass species.

The life cycle of weeds may be annual, biennial, or perennial. Annual weeds are most commonly identified as either winter/cool-season or summer/warm-season and survive only one season. If not controlled before they flower, they can produce seed that will sprout the following year. Biennial weeds survive for two growing seasons, reproducing vegetatively or by seed; however, seed is not produced until the second year. Perennial weeds survive many years, and though some may produce seed, many primarily reproduce vegetatively by creeping stems



dandelion

Figure 1. Broadleaves have wide leaves of various shapes with veins branching out in different directions.

(stolons and rhizomes), tubers, or fleshy roots. Perennial weeds are the hardest to control once established. The most troublesome weed species in lawns are listed in Table 1. For additional weeds, see the Turfgrass Weed Photo Gallery on the UC IPM Web site.

WEED INVASION

Weeds often invade turfgrass that is over- or under-watered, improperly fertilized, improperly mowed, or highly compacted. Lawns that have been weakened by plant pathogens or insect pests are also likely to become weedy because there is more open space for a weed to establish. Most weed invasions can be prevented with proper lawn maintenance and good preventative practices or remedied with overseeding. The most troublesome weed species that invade turfgrass are often associated with specific conditions (see Table 1). Identifying the weed species present may give an indication of the underlying problem responsible for the inva-



goosegrass

Figure 2. Grasses have narrow leaves with parallel veins, arranged in sets of two, and have round or flattened stems.

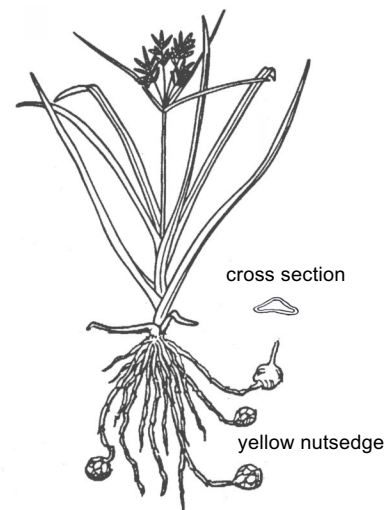


Figure 3. Sedges resemble grasses, but have leaves arranged in sets of three and stems that are triangular in cross-section.

sion and tell you what can be done to reduce the weed infestation. See the *Pest Notes* of the major weed species listed in Table 1 for detailed information.

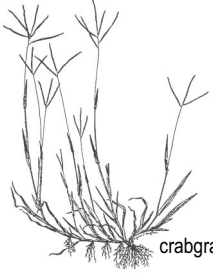
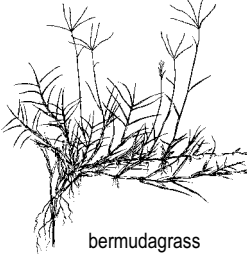
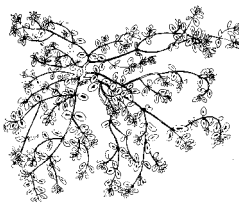


PEST NOTES

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Table 1. Special Weed Problems in Lawns and Their Associated Conditions.

	Weed species*	Associated condition(s)	Cultural management comments
 <p>crabgrass</p>	ANNUAL GRASSES		
	annual bluegrass	overwatering; compacted soil	reduce irrigation; aerate
	crabgrass (smooth and large)	overwatering or frequent light watering; mowing too short	water longer and less often; check mowing height
	goosegrass	overwatering; compacted soil	reduce irrigation; aerate
 <p>bermudagrass</p>	PERENNIAL GRASSES		
	bermudagrass	previous bermudagrass lawn or infestation; close mowing; sun and heat	remove plants before they spread; increase mowing height
	dallisgrass	overwatering; compacted soil	remove plants before they spread; reduce irrigation; aerate
 <p>spurge</p>	ANNUAL BROADLEAVES		
	California burclover, black medic	low nitrogen fertility	fertilize
	common knotweed	compacted soil	aerate
	spurges (spotted and prostrate)	closely mowed turfgrass with open areas; low nitrogen fertility	check mowing height; remove plants before they spread
 <p>plantain</p>	PERENNIAL BROADLEAVES		
	white clover	low nitrogen fertility	fertilize
	creeping woodsorrel	nearby sources of infestation	remove plants before they spread
	dandelion	poorly maintained thin areas or nearby sources of infestation	remove plants by hand; improve turfgrass management practices
	English daisy	moist areas of turfgrass mostly in cool coastal climates	keep turfgrass on dry side; improve turfgrass management practices
	plantains (buckhorn and broadleaf)	overwatering; compacted soil; poorly maintained open turfgrass areas; shaded areas in warm climates	reduce irrigation; aerate; improve turfgrass management practices
 <p>green kyllinga</p>	SEDGES		
	green kyllinga	overwatering; poor drainage; sun and heat	reduce irrigation
	nutsedge	overwatering; poor drainage; sun and heat; nearby infestation	reduce irrigation; remove plants before they spread

* Pest Notes are available for all listed species except goosegrass and English daisy.

WEED MANAGEMENT BEFORE PLANTING

Prepare Your Site

A healthy lawn begins with a properly prepared site. Before planting, remove existing vegetation and prepare the bed. If you expect annual weeds to be a problem, irrigate the site to allow weeds to germinate. Follow up with a shallow cultivation or an application of a nonselective herbicide such as glyphosate. Repeat this process if necessary.

Perennial weeds are harder to control than annuals. For perennials, dig out and remove as many weeds and other vegetation as possible. Cultivate the soil to bring up buried propagules (stems, rhizomes, and tubers). It is best to do this when conditions are warm and dry so that the propagules will desiccate on the soil surface. If you have particularly troublesome weed problems, continue to work the soil without irrigating for several months to bring up new propagules. A few species such as field bindweed and purple nutsedge cannot be controlled in this manner. A nonselective herbicide such as glyphosate, applied when weeds are actively growing, can also be used to kill many difficult-to-control perennials.

Soil solarization can be very effective at controlling many weed species prior to planting and is ideal for gardeners who want to avoid herbicide use. Once the area is cultivated, amended, and prepared for planting, place clear polyethylene plastic 1 to 2 mils (0.025–0.050 mm) thick over the moist soil surface and cover the edges with soil to hold them in place. For best results, soil solarization must be carried out during the time of highest solar radiation—from June to August in inland California—and the tarps must remain on the infested soil for 4 to 6 weeks. Solariza-

tion is less effective or ineffective in cooler coastal areas or in the shade. Many annual weeds can be controlled with this method; however, soil solarization is not as effective at controlling certain perennials such as field bindweed and nutsedge. See *Soil Solarization: A Nonpesticidal Method for Controlling Diseases, Nematodes and Weeds*, listed in References, for more information.

Many soils need to be amended with organic matter or nutrients. Amendments can improve drainage in tightly compacted clay soils or improve the water-holding capacity in sandy soils. The ability of soils to drain water and simultaneously hold enough water is extremely important in establishing the turfgrass root system and maintaining healthy lawns. Lawns thrive in soils with good drainage that allow the unrestricted flow of oxygen, nutrients, and water. When adding topsoil, make sure it is from a reputable source and that it is free of rocks, weed propagules such as rhizomes or tubers, and herbicide residues.

Select an Appropriate Turfgrass Species

Turfgrass species vary in their tolerance to extreme temperatures, shade, drought, and amount of wear. Cool-season species such as tall fescue, perennial ryegrass, and Kentucky bluegrass do best in northern and coastal California climates and actively grow during the spring and fall. Warm-season grasses such as bermudagrass, St. Augustinegrass, and zoysiagrass grow best in southern or Central Valley climates where summers are hot and dry and winters are relatively mild. Tall fescue is planted in many inland valleys of California and performs well in

spring and fall, but becomes stressed during cold winter and hot summer months. Bermudagrass is planted in inland valleys and southern coastal areas, where it performs well in the heat; however, it goes dormant during winter months when soil temperatures drop below 52°F. When planting a lawn, choose a species that best fits your specific conditions (Table 2). Poorly adapted species are more susceptible to weed invasions and require more intense maintenance than well-adapted species.

It is essential to choose a planting time that allows the turfgrass species to establish quickly and out-compete weeds. Warm-season grasses should be planted from mid-spring to midsummer. Cool-season grasses should be planted in early spring or fall. Lawns will compete with weeds more effectively if established quickly. Lawns established from sod have few weed problems from the moment they are planted. Lawns planted from seed, stolons, or plugs can take up to 2 months to become established and are therefore more susceptible to weed invasions.

WEED MANAGEMENT IN NEWLY PLANTED LAWNS

Even if a planting site has been carefully prepared, some weeds will probably develop in a new lawn. Remove weeds by hand as they appear. This will prevent them from producing seed and extending the invasion. Properly timed irrigation, mowing, and fertilization can keep weeds under control. In the first few weeks after planting, turfgrass roots are fairly short, extending only into the top few inches of soil. Water lightly to keep the root zone moist without saturating the soil. Once the turf-

Table 2. Turfgrass Species Best Adapted to Most California Conditions.

Turfgrass species	Tolerance						Temperature adaptation
	Heat	Cold	Drought	Shade	Salinity	Wear/Traffic	
bermudagrass	high	low	high	low	high	high	warm-season
Kentucky bluegrass*	low	high	low	mod	low	mod	cool-season
perennial ryegrass*	low	high	low	low	mod	high	cool-season
red fescue*	low	high	mod	high	low	mod	cool-season
St. Augustinegrass	high	low	mod	high	high	mod	warm-season
tall fescue	mod - high	mod	mod	mod	mod	mod - high	cool-season

* When planted as a mixed turfgrass (combining two or more turfgrass species) this species may have higher tolerance for heat if properly managed.

grass becomes established, encourage healthy root growth with deep, infrequent watering. Mow new lawns for the first time when their roots are firmly planted in the soil. Be sure the soil is fairly dry so that the young turfgrass is not torn from the ground.

WEED MANAGEMENT IN ESTABLISHED LAWNS

Irrigation

Many lawns are watered incorrectly. Poor irrigation practices can weaken turfgrass growth, allowing weeds to invade. Annual bluegrass, crabgrass, dallisgrass, and nutsedge are just a few weed species that thrive in poorly irrigated lawns. To maintain a healthy lawn, uniform coverage is needed. Sprinkler heads that are broken, obstructed, or set too low or too high may not reach all areas of the lawn and can result in dry or dead spots in an otherwise healthy turfgrass.

In general, deep, infrequent irrigation will encourage healthy root growth. Light, frequent watering is only required when the turfgrass has just been planted and the root system is developing. Watering established turfgrass lightly and frequently creates a shallow-rooted lawn, making it less durable and allowing shallow-rooted weeds such as crabgrass to get the competitive edge. Ideally, turfgrass should be irrigated deep enough to penetrate the soil to a depth of 6 to 8 inches. Allow the soil to partially dry out between waterings. The top 1 to 2 inches of soil should be fairly dry before water is applied again.

Water requirements vary among turfgrass species and also vary depending on climate, time of year, and growing conditions. As a general rule, warm-season grasses only need to be watered once or twice a week. Cool-season grasses require more frequent watering, up to three times a week in hot weather. Turfgrass species growing in shade require less water than the same species growing in full sun. Turfgrass growing on clay soils does not need to be watered as frequently as turfgrass growing on sandy soils. Clay soils retain water longer than sandy soils; sandy soils dry out quickly. For specific irrigation requirements for warm- and cool-season turfgrasses in

various regions of California and at different sprinkler outputs, see *Lawn Watering Guide for California* listed in References.

Mowing

Each turfgrass species has specific mowing height requirements. Mowing some grasses too short can weaken the turfgrass and increase weed invasions. Alternatively, if some grasses are not mowed short enough, the thatch layer can build up, reducing water penetration and weakening the turfgrass. See *The UC Guide to Healthy Lawns* listed in References for mowing requirements for common turfgrass species.

Mow grasses more frequently when they are actively growing. A standard guide is to remove no more than one-third of the leaf blade at each mowing. If too much is removed at one time, it can take some time for the grass to recover, giving weeds a chance to invade. Lawns with weed invasions often appear uneven. Mow weedy lawns frequently enough to avoid this patchy appearance and prevent flower and weed seed formation. Be sure that mower blades are sharp enough so that the turfgrass is not damaged. If mowers are moved from weedy lawns to other lawns, be sure to wash off the blades to avoid transport of weed seeds and propagules. Avoid mowing lawns when the soil is wet, such as after rain or irrigation; moving a mower over wet soil can lead to compaction.

Fertilizing

To maintain a healthy lawn, follow fertilizing guidelines carefully. Begin a regular fertilization program approximately 6 weeks after planting. In general, lawns need to be fertilized about four times a year with no more than 1 pound of actual nitrogen per 1,000 square feet per application. See *Practical Lawn Fertilization* in References for requirements for specific turfgrass species.

Thatch

Regular thatch removal will help keep your turfgrass healthy and competitive with weeds. Thatch is a layer of organic matter (stems, stolons, roots) that develops between the turfgrass blades and the soil surface. A thin layer of thatch is normal and even beneficial; it can help

limit weed germination. Some turfgrass species, particularly creeping grasses, develop thick thatch layers that can prevent the circulation of air, water, and nutrients in the soil. Generally, you should dethatch your lawn when the thatch layer is more than ½ inch thick. For some species, such as zoysiagrass, bermudagrass, or Kentucky bluegrass, this may mean dethatching every year. For other species, such as tall fescue, dethatching may only be needed every 5 years or not at all. Use a thatching rake on small lawns to loosen the layer of thatch. On creeping-type grass lawns, such as bermudagrass, use a verticutter, or dethatcher, to cut through the lawn to the soil surface.

Aeration

Heavy traffic can compact soil over time. Soil compaction restricts the flow of oxygen, water, and nutrients into the roots, causing the turfgrass to grow slowly and making it more susceptible to weed invasions. Alleviate soil compaction with regular aeration. Lawns on heavy clay soils or lawns with heavy foot or equipment traffic may need to be aerated several times a year while lawns with little activity may only need to be aerated once a year or less.

Aerators, sometimes called aerifiers, remove small cores of soil or create pores or channels in the rooting zone. A hand-held aerifier may be adequate on small lawns. For larger lawns, machine-driven aerifiers are more practical and can be gotten from equipment rental businesses. Aerate when the turfgrass is actively growing.

Hand-weeding

Controlling occasional weeds by hand-pulling may be all that is necessary if you practice regular and proper maintenance procedures. Hand-weeding is particularly important for preventing infestations of creeping woodsorrel, nutsedge, dandelion, spurge, dallisgrass, and bermudagrass. Remove weeds while they are still young and before they set seed or produce rhizomes or tubers. Remove small patches before they get large. Making this a regular habit will greatly reduce the number of weeds in your lawn. Be sure to remove the entire weed, including the root. A dandelion fork, or fishtail

weeder, is useful for removing weeds with a thick taproot.

Herbicides

If your lawn is properly maintained, herbicides will generally not be necessary. When they are needed, use them as part of an integrated management program that includes good cultural practices. No single herbicide will control all lawn weeds, and not all herbicides can be used on all lawn species. You must identify your weed problem(s) and turfgrass species before choosing an herbicide. A few of the most serious lawn weeds, such as some perennial grasses, cannot be effectively controlled with herbicides without killing the turfgrass as well.

Herbicides are classified in several ways:

- preemergent or postemergent
- contact or systemic
- selective or nonselective.

Preemergent herbicides are applied before weeds emerge from the soil; they kill weed seedlings as they germinate and try to emerge. In lawns they are primarily used against annual grass weeds such as annual bluegrass and crabgrass, but there are also preemergent herbicides that are effective against many broadleaf weeds. Postemergent herbicides are applied after weeds have emerged from the soil; they control actively growing weeds. Postemergent herbicides may have either contact or systemic activity. Contact herbicides cause localized injury where the chemical comes in contact with the plant. In contrast, systemic herbicides move within the plant causing injury at additional sites in the plant and can control older weeds. Examples include glyphosate (Roundup), triclopyr (Turflon), or 2,4-D/dicamba/mecoprop mixtures.

Selective herbicides kill target weeds without damaging desirable turfgrass species. They are toxic to only certain plants or weeds. For example, 2,4-D selectively kills only broadleaf plants and not grasses, and pendimethalin controls crabgrass as it germinates but does not injure established turfgrass. Nonselective herbicides kill all or most vegetation including turfgrass; use them only prior to planting a lawn, during renovation, or as spot treatments.

The herbicide you choose will depend on the types of weeds you are trying to control and the tolerance of your turfgrass species. Table 3 lists some common herbicides labeled for use on turfgrass or for turfgrass renovation and highlights the types of weeds or special weed problems they control. PLEASE NOTE THAT SEVERAL OF THE PESTICIDES MENTIONED HERE ARE AVAILABLE FOR PROFESSIONAL USE ONLY.

Herbicides for Broadleaves. The easiest weeds to control in grass lawns are annual broadleaves. Many products are available and formulated for specific weeds or for use on specific turfgrass species. Generally these weed killers are postemergent, systemic herbicides containing combinations of two or three active ingredients, such as dicamba, mecoprop, or 2,4-D, and are very effective in controlling numerous broadleaf weeds. Triclopyr is also an effective broadleaf herbicide but will cause injury to bermudagrass lawns and other stoloniferous turfgrass: it is safe to use on most cool-season turfgrass such as bluegrass, ryegrass, and tall fescue lawns. Dicamba, mecoprop, triclopyr, and 2,4-D and their combinations are also effective against perennial broadleaves.

Herbicides for Grass Weeds. Annual grasses such as crabgrass, foxtail, and annual bluegrass can be effectively controlled in established lawns with preemergent herbicides such as benefin, bensulide, dithiopyr, oryzalin, pendimethalin, and prodiamine. The key to success is to apply the herbicide 2 to 3 weeks prior to weed germination and to thoroughly water the herbicide into the lawn. It may take two applications per year (late winter and mid-spring) to clean up a heavy weed infestation, but herbicides should not be needed year after year if cultural practices are modified to favor the turfgrass. Specific preemergent herbicides will effectively control specific weeds. It is very important to identify the weed to be controlled and understand the time of year it most often germinates.

It is much more difficult to control weedy grasses with postemergent prod-

ucts. Products containing calcium acid methanearsonate, DSMA, or MSMA reduce crabgrass and dallisgrass infestations but not as effectively, and several applications are needed in summer and in subsequent years. Some perennial grasses, such as bermudagrass or knotgrass growing in a tall fescue lawn, are extremely difficult to control. Oftentimes a nonselective, systemic herbicide such as glyphosate is needed. Make spot treatments because glyphosate will kill turfgrass as well. It must be applied when weeds are actively growing and is most successful when applied in early fall before the bermudagrass goes into dormancy. Bermudagrass growing in a tall fescue lawn can also be suppressed with repeated applications of triclopyr (Turflon). See the label for specific directions.

Herbicides for Sedges. Sedges, such as yellow and purple nutsedge and green kyllinga, can be killed with spot treatments of a nonselective postemergent herbicide such as glyphosate. Alternatively you can make two applications with halosulfuron (Manage) using a nonionic surfactant or you can repeatedly spray with a postemergent selective herbicide such as bentazon or MSMA. No preemergent herbicides kill nutsedge tubers in turfgrass. Metolachlor (Pennant Magnum) is registered for control of yellow nutsedge but is for professional use only and can only be used on warm-season turfgrasses. Most preemergent materials, such as benefin, DCPA, and pendimethalin, are effective at killing seeds of green kyllinga.

Herbicides for Newly Seeded Lawns. Special care should be taken when applying herbicides on newly seeded lawns because of the sensitivity of seedling plants. Among the preemergence herbicides, DCPA (Dacthal) can be used "at greening" when a solid stand of turfgrass is apparent. Dacthal is one of the safest herbicides for most turfgrass species. It is used primarily for annual bluegrass and crabgrass control but will also control several broadleaf weeds including short-term control of spurge. Another preemergent herbicide, siduron (Tupersan), can be used on

newly seeded or established, cool-season turfgrass for control of broadleaf seedlings and warm-season grass weeds. Siduron should not be used on warm-season turfgrass species. Among the postemergent herbicides, broadleaf weed killers such as dicamba, triclopyr (Turflon), or 2,4-D can be used for broadleaf control once the turfgrass has produced several tillers and has been mowed two or three times.

Weed and Feed Products. Some fertilizer products contain either preemergent or postemergent (or both) herbicides for weed control (usually crabgrass prevention or broadleaf weed control). Use these combination products only when the lawn has a known weed problem and not every time you fertilize. Herbicides should only be applied when you have observed high numbers of weeds and are sure treat-

ment is necessary. With preemergent products, this means relying upon weed populations observed last season. Be sure the active ingredient in the product is one that will control the weed species causing your problems and also that the timing of the application is right. There *is no point* in applying preemergent herbicides after target weeds have emerged. Be aware that certain broadleaf herbicides, such as dicamba and triclopyr, can be absorbed by tree roots growing in lawns and may cause tree injury if applied too close to the tree drip line. Precautions are always listed on the herbicide label.

Other Weed Control Products. Corn gluten meal is a fine yellow powder that is a waste product left over from the processing of corn and is now marketed for weed control. It has high nitrogen content and can be top-dressed

onto established turfgrass. Research conducted in the Midwest suggests that repeated applications of corn gluten meal may prevent the emergence of some weeds, but the research results are not consistent. In experiments conducted in California lawns, corn gluten meal did not provide satisfactory control. One hypothesis about why corn gluten meal may appear to help in weed management is that its high nitrogen content acts as a fertilizer, making the turfgrass more competitive with weeds. Corn gluten meal has no effect on already emerged weeds. It is also significantly more expensive than other registered preemergent products known to be effective.

Herbicide Success Tips. Lawn and garden companies market their own brand names of herbicides. These trade names are so numerous and change so

Table 3. Example Herbicides in Home Lawns.*

Group I. Selective Preemergent Herbicides (Herbicides applied before weeds emerge).

Common name	Sample trade name(s)	Readily available to home gardeners	Comments
benefin	Balan	no	controls grasses and a few broadleaves (e.g., speedwell); has some turfgrass species restrictions
benefin + oryzalin	Green Light Amaze XL 2G	yes	controls grasses and some broadleaves on warm-season turfgrass species and tall fescue (with some restrictions)
		no	
benefin + trifluralin	Green Light Crabgrass Preventer Team 2G	yes	has extended grass control; has some turfgrass species restrictions
		no	
bensulide	Green Light Betasan Betasan, Pre-San	yes	controls many grasses (primarily annual bluegrass) and some broadleaves (e.g., henbit); exclude children and pets until treatment area has been thoroughly sprinkler-irrigated
		no	
DCPA	Dacthal	no	controls grasses and some broadleaves (e.g., spurge); exclude children and pets until treatment area has been thoroughly sprinkler-irrigated; has some turfgrass species restrictions
dithiopyr	Vigoro Crabgrass Preventer Dimension	yes	controls grasses (with some postemergence activity on young crabgrass) and broadleaves (e.g., oxalis, spurge); may injure some turfgrass species
		no	
isoxaben	Green Light Portrait Broadleaf Weed Preventer Gallery	yes	controls broadleaves (e.g., oxalis, spurge) and has very minimal activity on grasses; has some turfgrass species restrictions
		no	
metolachlor	Pennant Magnum	no	controls yellow nutsedge, some grasses, and some broadleaves; for use on warm-season turfgrass species only
napropamide	Devrinol	no	controls grasses and some broadleaves
oryzalin	Monterey Weed Stopper Surflan	yes	controls grasses and some broadleaves; for use on warm-season turfgrass species and tall fescue (with some restrictions)
		no	
pendimethalin	Scotts Halts Crabgrass Preventer Pendulum, Pre-M	yes	controls grasses (very effective on crabgrass) and some broadleaves; has some turfgrass species restrictions
		no	
prodiamine	Barricade	no	controls grasses (very effective on annual bluegrass and crabgrass) and some broadleaves; has some turfgrass species restrictions and may thin grass
siduron	Tupersan	no	used in new or newly renovated cool-season lawns to suppress warm-season grass weeds; not for use on warm-season turfgrass species

Continued on next page

Table 3. Example Herbicides in Home Lawns, continued

Group II: Selective Postemergent Herbicides (Herbicides applied after weeds emerge).

Common name	Sample trade name(s)	Readily available to home gardeners	Comments
mixtures of 2,4-D, dicamba, and mecoprop (MCP)	Trimec Lawn Weed Killer	yes	combines 3 active ingredients and controls most broadleaves (weak on oxalis); dicamba products may kill ornamentals if roots are in lawn or drift occurs
	Spectracide Weed Stop	yes	
	Ortho Weed-b-Gon Weed Killer for Lawns	yes	
	Bayer Southern Weed Killer	yes	
mixtures of 2,4-D, dicamba, MCP, and MSMA	Bayer All in One Weed Killer	yes	combines 4 active ingredients and controls most broadleaves (stronger on oxalis in warm-season lawns than the mixture above); some grass control if MSMA added; dicamba products may kill ornamentals if roots are in lawn or drift occurs
	Gordon's Trimec Plus	no	
2,4-D + 2,4-DP + MCP	Monterey Weed Whacker	yes	combines 3 active ingredients and controls spurge, oxalis, dandelion, and other broadleaf weeds
bentazon	Monterey Nutgrass 'Nihilator'	yes	controls yellow nutsedge and some broadleaves (e.g., purslane, henbit); has some turfgrass species restrictions
calcium acid methanearsonate (CMA, CMA)	Ortho Weed-b-Gon Crabgrass Killer for Lawns	yes	controls some grasses and sedges
DSMA	Drexel DSMA Slurry	no	controls some grasses, nutsedge, and some broadleaves; has some turfgrass species restrictions
halosulfuron	Manage	no	controls sedges
MSMA	Monterey Weed-Hoe	yes	controls some grasses and sedges; can injure turfgrass
	MSMA Crabgrass Killer	yes	
triclopyr	Monterey Turflon Ester	yes	controls broadleaves (especially clover, oxalis) and suppresses bermudagrass and kikuyugrass in cool-season lawns; not for use on warm-season turfgrass species; do not apply around trees or shrubs because injury may result
	Turflon	no	
triclopyr + MCP + dicamba	Monterey Spurge Power	yes	controls a broader spectrum of broadleaves (e.g., spurge, wild violet, dandelion); has some turfgrass species restrictions; not for use on warm-season turfgrass species; dicamba products may kill ornamentals if roots are in lawn or drift occurs

Group III. Nonselective Herbicides for Use in Turfgrass Renovation (Will kill existing lawn and plants).

Common name (sample trade name)

- cacodylic acid and sodium cacodylate (Monterey Weed Ender)
- diquat (Spectracide Grass and Weed Killer)
- diquat + fluzifop (Spectracide Systemic Grass & Weed Killer 2)
- glufosinate (Finale Weed & Grass Killer)
- glyphosate (Roundup)
- glyphosate + imazapyr (Ortho Groundclear Complete Vegetation Killer)
- pelargonic acid (Monterey Quik Weed Killer)

* These are example trade names. Trade names and registrations change frequently. Not all listed products may currently be registered. Although herbicide products containing fertilizers are available, they are not included. For more details on herbicide products available to professionals, see UC IPM Pest Management Guidelines: Turfgrass-Weeds, listed in References.

often that they cannot all be listed in this publication. Shop for herbicides by looking for the common name or active ingredient that appears on the label in small print under the title "Ingredients." Unlike brand names, common names for active ingredients do not change from company to company. Different products will vary in the percentage of active ingredient they contain. Some products are formulated as

ready-to-use to allow for the convenience of no mixing; others are formulated as granules; and many others as higher concentration liquid sprays that require mixing.

Follow all label directions carefully and only apply herbicides at the time of year and at the rates recommended. Be sure the herbicide is effective against the weed you are trying to control and that it is recommended for your type of

lawn. Improper use could injure or kill desirable turfgrass or other plants in the landscape. Many broadleaf weed herbicides are prone to drift or can be injurious to shallow tree roots growing in the lawn, especially dicamba, so exercise proper caution. Do not apply herbicides under hot, dry, or windy conditions as they could injure turfgrass or nearby ornamentals. **If you are applying preemergent herbicides, remember**

that you cannot reseed desirable turfgrass species for several months after application. If you are applying preemergent herbicides, apply them after aerating. Otherwise, the herbicides will be removed from the soil with the cores.

RENOVATING LAWNS

Before renovating your lawn, identify the reasons why the lawn became weedy. Were you growing the right turfgrass species for your area? Did you follow recommended irrigation, fertilization, and mowing practices? Did you have good drainage? Before you re-plant, correct the problems that allowed weeds to invade your lawn previously. Use good management practices on your lawn to reduce new weed invasions.

If weeds have completely taken over a small area of your lawn, you may want to consider a partial renovation.

For more information contact the University of California Cooperative Extension or agricultural commissioner's office in your county. See your phone book for addresses and phone numbers.

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ILLUSTRATIONS: **Figs 1 & 2:** *Common Weeds of the United States*. 1971. USDA.
Fig. 3: Christine M. Dewees. **Table 1:** crabgrass, bermudagrass, spotted spurge – *Common Weeds of the United States*. 1971. USDA (G.P.O.). **buckhorn plantain, green kyllinga** – Christine M. Dewees.

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To simplify information, trade names of products have been used. No endorsement of named products is intended, nor is criticism implied of similar products that are not mentioned.

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Dig out the affected area, remove and destroy weeds, and work the soil with a garden rake to break up clods and remove weed debris. Add soil amendments and starter fertilizer and then level and firm the site. Irrigate and patch the soil with sod, seed, stolons, or plugs and irrigate again.

If your lawn is primarily weeds, a complete renovation may be necessary. The first step in a complete renovation is to kill and remove the existing turfgrass and weeds. There are a few ways to remove a lawn. For instance, you can dig out the turfgrass and weeds, prepare the site for planting, and then solarize the soil. Alternatively, you can rototill the old lawn and rake up the old turfgrass and weeds. You will need to repeat the tilling and raking until all of the debris is gone. Another method is to apply a nonselective herbicide such as glyphosate to kill the existing lawn and weeds, remove all the plant material you can, and work the soil until debris is gone. Once the old lawn is removed, prepare the site and plant the new lawn.

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WARNING ON THE USE OF CHEMICALS

Pesticides are poisonous. Always read and carefully follow all precautions and safety recommendations given on the container label. Store all chemicals in the original labeled containers in a locked cabinet or shed, away from food or feeds, and out of the reach of children, unauthorized persons, pets, and livestock.

Confine chemicals to the property being treated. Avoid drift onto neighboring properties, especially gardens containing fruits or vegetables ready to be picked.

Do not place containers containing pesticide in the trash nor pour pesticides down sink or toilet. Either use the pesticide according to the label or take unwanted pesticides to a Household Hazardous Waste Collection site. Contact your county agricultural commissioner for additional information on safe container disposal and for the location of the Household Hazardous Waste Collection site nearest you. Dispose of empty containers by following label directions. Never reuse or burn the containers or dispose of them in such a manner that they may contaminate water supplies or natural waterways.

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