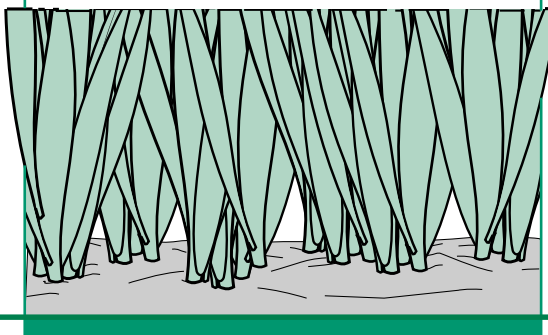


WEED CONTROL IN HOME LAWNS

Turfgrass



Ask homeowners about their No. 1 lawn concern, and the usual reply is "weeds." But most homeowners are too narrow in their approach to controlling weeds. When someone asks, "How do I control *weed x*?" they usually mean, "What product do I spray?" Although herbicides are an important tool for controlling weeds, they are only a part of a total weed control program. The best defense against weeds is a dense, healthy, vigorous lawn, which can only be obtained through proper fertilizing, watering, and mowing. While this publication discusses both cultural and chemical control of weeds, emphasis is given to chemical control. For more depth on the cultural practices that are an integral part of a weed control program, see the K-State Research and Extension publications *Fertilizing Kansas Lawns*, *Watering Your Lawn*, and *Mowing Your Lawn*.

Weeds are opportunists, taking advantage of open spaces in thin, weak stands of turf. Although improper fertilizing, watering, and mowing are the most common causes of poor lawns, insects and diseases can also expose the lawn to weed invasion. Always try to determine why weeds invaded the lawn, and correct the problem. If the basic cause is not corrected, weeds will return even though existing weeds may be eradicated with herbicides.

This publication outlines the basic concepts of weed control and provides a guide to the safe, effective use of herbicides for controlling lawn weeds. It does not contain complete information on each product. For application information, cautions, and restrictions, refer to the label directions on the product container.

Developing a Lawn Weed Control Program

1. Know what kind of grass, and how many square feet of lawn area you have.
2. Identify the problem weed or weeds.
3. Determine why the weeds invaded the lawn and correct the conditions or cultural practices that caused the problem.

4. When chemical control is needed:

- Select a herbicide that is effective for the weeds and safe for the turfgrass.
- Follow all label directions and precautions.
- Apply the herbicide at the correct time and rate.
- Apply it uniformly over the area without skips or overlapping.
- Repeat the application when specified on the label.

5. Follow a good turf management program along with the weed control program.

IDENTIFYING LAWN WEEDS

There are several classes of lawn weeds that require different methods of control at different times during the growing season. No one product or single application will control all weeds for the entire season. So it is necessary to identify the problem weed (or weeds) to select the most effective methods and times of control.

Weeds can be taken to the county Research and Extension office for identification. It is best to take several entire plants, including roots, rather than just a leaf. Fresh samples are easier to identify than wilted or dried samples.

Classes of Turf Weeds

Turf weeds are divided into five classes for determining the appropriate method of control: (1) annual grasses, (2) annual broadleaf weeds, (3) perennial grasses, (4) perennial broadleaf weeds and (5) miscellaneous weeds. Annual weeds are further classified as summer or winter annuals. Summer annuals germinate in spring and die in fall, while winter annuals germinate in fall and die in late spring. Perennial weeds are further classified as warm-season or cool-season to identify when they are prevalent and determine when they should be controlled.

Annual grasses germinate, grow, and produce seeds each year. They resemble desirable turfgrasses in their growth

habits, but differ in texture and color. Crabgrass and foxtail are examples of annual grasses.

Annual broadleaf weeds also complete their life cycle from seed within one year but generally require different control measures from grass weeds. They contrast more sharply from turfgrasses in form and texture. The leaf width is often much broader than that of turfgrass. Examples of annual broadleaf weeds include chickweed, henbit and spurge.

Perennial grasses persist for more than one growing season because of their perennial root system, even though the topgrowth may die each winter. Most perennial grasses cannot be selectively controlled in turfgrass. Some perennial grasses such as Bermudagrass and tall fescue are weeds in bluegrass lawns, for example, but by themselves can make a desirable turf. Other perennial grass weeds are nimblewill and quackgrass.

Perennial broadleaf weeds persist from year to year, but can be selectively controlled in turfgrass. If perennial weeds are to be chemically controlled, they must be actively growing. Dandelions and bindweed are examples of perennial broadleaf weeds.

Biennial weeds are treated as perennials for control purposes. Biennials grow vegetatively for one year and flower and seed in the second year. Examples include wild carrot, mullein, and some thistles. Some weeds such as black medic may fit more than one class.

Miscellaneous weeds include those that are neither true grasses nor broadleaf weeds. Nutsedge, wild garlic, algae and moss fall into this category. These sometimes require special control methods.

Annual Grass Weeds

Summer annuals

barnyardgrass
crabgrass
foxtail
goosegrass
sandbur

Winter annuals

little barley
annual bluegrass
annual bromes
cheat
downy brome
Japanese brome

Perennial Grass Weeds

Warm season

Bermudagrass
nimblewill
silver beardgrass
windmillgrass

Cool season

tall fescue
quackgrass
orchardgrass
rough bluegrass

Annual Broadleaf Weeds

Summer annuals

carpetweed
fleabane
kochia
lambquarter
lespedeza
mallow
morning glory
oxalis
pigweed

Winter annuals

bedstraw
chickweed
deadnettle
henbit
knotweed
mustards
pepperweed
shepherd's-purse
sowthistle

puncturevine
purslane
ragweed
smartweed
spurge

speedwell
wild geranium
wild lettuce

Perennial Broadleaf Weeds

Warm-season

asters
creeping oxalis
mallow

Cool-season

bellflower

white clover
dandelion
dock
ground ivy
healall
mousear chickweed
plantain
red sorrel
sheep sorrel
thistles
violets
yarrow

Miscellaneous Weeds

algae
moss
nutsedge
wild garlic
wild onion

LAWN WEEDS: THE BATTLE FOR CONTROL

Why Weeds Invade Lawns

Improper mowing. Mowing too low and too infrequently thins the turf, allowing weeds to get started.

Improper watering. Frequent watering encourages weed seed germination, disease, thatch, and a shallow-rooted turf that is less competitive with weeds for soil moisture and nutrients.

Improper fertilizing. Fertilizing too much, too little or at the wrong time may benefit weeds more than grass.

Insect and disease injury. Weeds rapidly invade lawn areas that are thinned by insects and diseases.

Compacted soil. Soil compaction is a hidden stress on the turfgrass root system. The grass is unable to compete effectively with weeds. Clay and silty soils are especially prone to compaction.

Excessive wear. Turf areas that are used for recreation and sports are subjected to wear and compaction. Weeds become a problem in these areas, requiring intense weed control and turf management.

Wrong kind of grass. The wrong kind of grass for the location will gradually decline and be invaded by weeds.

Environmental stress. Weeds often take over a lawn after it has been weakened and thinned from weather-related stresses.

Thatch. Excessive thatch causes shallow-rooted grass and contributes to insect and disease problems, which are followed by weed invasion. Thatch also can reduce the effectiveness of some soil-applied weed control chemicals.

Methods of Weed Control

Turfgrass competition. Maintaining a strong, vigorous turf will help prevent the invasion of new weeds and help to crowd out existing weeds.

To grow turf that will compete with weeds:

- Select the best turfgrass species for your area and use recommended varieties.
- Maintain the soil pH between 6 and 7, if possible.
- Mow, water and fertilizer properly.
- Control damage from insects and disease.
- Control thatch.
- Aerate compacted soil.

Mechanical control. Mechanical weed control includes tillage before seeding the lawn, proper mowing, and hand weeding. A few weeds can be pulled or dug by hand, but hand pulling may not be effective on deep-rooted weeds. Regular mowing at the proper height controls many kinds of weeds.

Chemical control. For some weeds, herbicides may be the only practical or effective method of control. Herbicides are especially useful during new lawn establishment or renovation of an old lawn. Once a dense turf is established and maintained properly, weed problems should be minimal. Do not depend on herbicides in lieu of good turfgrass management. Chemical weed control should be considered an aid to good management, not a substitute for it.

CHEMICAL WEED CONTROL

Herbicides should be used only when necessary and always in conjunction with a good lawn management program. Always read the label directions before using an herbicide. Improper use can result in poor weed control, damage to the turf and damage to other landscape and garden plants. The user is responsible for any damage that results from not following label directions. Also, it is a violation of state and federal law to use any product in a manner that is inconsistent with the label.

What the Label Will Tell You

- Legal uses and restrictions
- Turfgrasses on which the herbicide can be used
- Weeds controlled
- Rates and when to apply
- Application and safety instructions
- Waiting period before reseeding
- Precautions and environmental hazards
- Proper storage and disposal

Selecting and Applying Herbicides

Choosing a selective herbicide for lawn weeds involves not only selecting products that will control the weeds, but that will be safe for the particular kind of lawn grass. However, some weeds can only be eradicated with a nonselective herbicide that kills all vegetation, including the lawn grass. The treated area must then be replanted.

Granular herbicides and fertilizers containing herbicides are ready to use as purchased and are applied with a lawn spreader. Fertilizer-herbicide combinations are more readily available to homeowners than granular herbicides. Although fertilizer-herbicide combinations are convenient to use, their main limitation is that the best times for fertilizing and controlling weeds are not always the same. Using the same fertilizer-herbicide combination each time the lawn is fertilized will result in applying too much herbicide, which is wasteful, costly, and could damage the lawn. Conversely, using a combination product every time weeds become a problem will result in over-fertilizing, as well as fertilizing at the wrong time for the grass. Granular herbicides and fertilizer-herbicide combinations are generally more expensive based on the amount of actual ingredient than concentrated powders and liquids.

It is important to check the actual application rate of the spreader. If spreader parts become worn, bent or loose, the product can be inaccurately or unevenly applied even though the suggested setting is used. How fast a person pushes the spreader also affects the rate of application.

The area to be treated should be measured and the measurement converted into square feet or acres in order to determine how much product to buy and the proper rate of application. Some products are available in ready-to-use aerosol cans or spray bottles for spot treatment of small areas.

WHEN TO APPLY WEED CONTROL

There are basically two types of chemical weed control applications based on when they are applied:

Preemergence—the herbicide is applied to the soil before the weed seeds germinate to prevent them from growing.

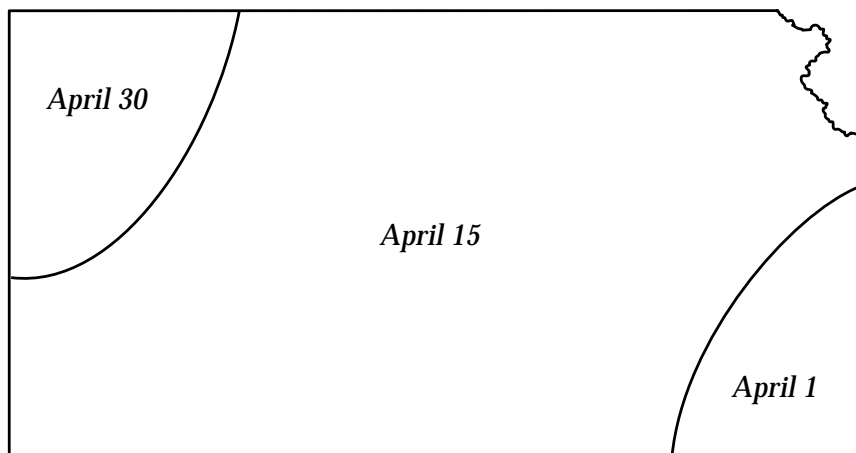
Postemergence—the herbicide is applied to growing weeds after their seeds have germinated and the plants have emerged from the soil.

Preemergence control

Preemergence herbicides are used primarily to prevent annual grasses such as crabgrass, but they also control some annual broadleaf weeds from seed. The product should be applied several weeks before weed seed germination is expected. Preemergence herbicides are not effective after the weeds emerge. A second application often is needed to extend the period of control, depending on the product and rate used and the weeds to be controlled. Most preemergence products should be watered in within 3 days after application with a half inch or more of water.

The time to apply preemergence herbicides depends on the kinds of weeds to be controlled and when they germinate. To control crabgrass, foxtail and other warm-season annual grasses, the product is applied in early spring. A good guide for crabgrass control is to have the product applied by the time redbud trees reach full-bloom. The date of April 15 (two weeks earlier for southeast Kansas and two weeks later for northwest Kansas) is an approximate guide, but weather conditions vary from year to year.

Apply crabgrass preventers no later than these dates:



these weeds are a special problem, additional fall applications may have to be used about mid-September. See the section on “Cautions When Seeding or Reseeding.”

Annual broadleaf weeds such as chickweed, henbit and shepherd’s-purse are winter annuals that germinate in the fall. Speedwell (veronica) may germinate in late fall or early spring. Knotweed germinates in late winter or very early spring, often in February under snow cover. The appropriate preemergence herbicide should be applied about mid-September for these weeds. (If knotweed is the targeted weed, wait until November.) Annual bluegrass begins germination earlier and requires preemergence application by early August. Germination may also occur through early

spring. Make sure the product you choose is labelled for the weeds you want to control.

Products That “Break the Mold”: Barricade, Dimension and Gallery

Barricade and Dimension are two newer preemergence herbicides that have a longer residual than other products. If the correct rates are used, both products typically give season-long control of annual grasses like crabgrass. Because they are only available to homeowners on fertilizer carriers, their use should be limited to November (Barricade only), or in the spring (Dimension only) when fertilizer is used for spring growth. Spring applications should be early enough to meet deadlines for good crabgrass control.

Gallery (isoxaben) is used primarily for preemergence control of broadleaf weeds, including dandelion. Gallery will not control existing dandelions, but will prevent dandelion seeds (along with many other species—see table below) from growing into new plants. In most cases, however, it is less expensive and just as effective to use postemergence broadleaf weed killers.

Controlling Cool-Season Annuals With Preemergence Herbicides

Cool-season grasses, such as annual bluegrass, annual bromes, and little barley germinate in early fall after spring-applied preemergence chemicals are no longer effective. If

Cautions When Seeding or Reseeding

When planning to seed or reseed a lawn, it is important to remember that most preemergence herbicides will also kill young plants as they emerge. After a preemergence herbicide is applied, there is a waiting interval before grass can be safely seeded or reseeded. Check the label to determine the length of the waiting period. The only product that can be used at the time of seeding or reseeding cool-season grasses is Tupersan (siduron). It is most commonly available in fertilizers labeled for crabgrass control in new lawns. It should only be used in this form when seeding is done in the spring.

The waiting interval varies with the product used, rate, and number of applications. Higher rates and repeat applications may require a longer waiting period before reseeding. Do not use preemergence herbicides (except Tupersan) until the new grass has been mowed three times. Preemergence herbicides will prevent growth of grass seed that has not yet germinated at the time of application.

Do not apply broadleaf herbicides within 4 to 6 weeks before seeding. After seeding, do not apply them until the

Preemergence Herbicides for Kansas Turfgrasses (common name in parentheses*)

	Bluegrass	Tall fescue	Perennial ryegrass	Bermuda-grass	Zoysia-grass	Buffalo-grass
Balan (benefin)	X	X	X	X	X	
Barricade (prodiamine)	X	X	X	X	X	X
Betasan (bensulide)	X	X	X	X	X	
Dacthal (DCPA)	X	X	X	X	X	X
Dimension (dithiopyr)	X	X	X	X	X	X
Gallery (isoxaben)	X	X	X	X	X	X
Halts (pendimethalin)	X	X	X	X	X	X
Surflan (oryzalin)		X		X		X
Team (benefin + trifluralin)	X	X	X	X	X	
Tupersan (siduron)	X	X	X			
XL (benefin + oryzalin)		X		X	X	X

*Note: Common names are given because many products are sold under various trade names; additionally, “weed and feed” products often list only the common name.

X = Active ingredients is labeled for use; see product label for specific instructions.

Annual Weeds Controlled with Preemergence Chemicals*

(Common names of herbicides are in parenthesis**)

	Balan (benefin)	Barricade (prodiamine)	Betasan (bensulide)	Dacthal (DCPA)	Dimension (dithiopyr)	Gallery (isoxaben)	Halts (pendimethalin)	Surflan (oryzalin)	Team (benefin+ trifluralin)	Tupersan (siduron)	XL (benefin+ trifluralin)
Barley, little								X			
Barnyard grass	X	X	X	X	X		X	X	X	X	X
Bluegrass, annual	X	X	X	X	X		X	X	X		X
Carpetweed		X		X	X		X	X			X
Chickweed		X		X	X	X	X	X			X
Crabgrass	X	X	X	X	X		X	X	X	X	X
Deadnettle			X								
Foxtail	X	X	X	X	X		X	X	X	X	X
Goosegrass	X	X	X	X	X		X	X	X		X
Henbit		X	X		X	X	X	X			X
Knotweed		X			X	X	X	X			X
Lambsquarter		X		X	X	X	X	X			X
Oxalis		X			X	X	X	X	X		X
Panicum, fall		X	X				X	X			X
Pigweed		X	X	X		X	X	X			X
Puncturevine							X	X			X
Purslane		X		X	X	X	X	X			X
Sandbur, grass				X			X	X			X
Shepherd's-purse		X	X		X	X	X	X			X
Speedwell		X		X	X	X	X				
Spurge		X		X	X	X	X	X	X		X
Witchgrass		X		X			X	X			X

*According to label of the basic product. Reformulated products under various brands may not include all weeds listed here.

**Note: Common names are given because many products are sold under various trade names; additionally, "weed and feed" products often only list the common name.

new grass has been mowed three times. The first application of a broadleaf herbicide on new grass should be at a reduced rate.

During the establishment period, mow, water, and fertilize properly so the grass will fill in and mature as rapidly as possible. Mowing frequently will keep most weeds in check until a herbicide can be used. See the K-State Research and Extension publications, "Planting a Home Lawn" and "Overseeding Cool-Season Lawns," for recommendations on the care of new lawns.

Postemergence Weed Control

Postemergence applications are used primarily for the control of broadleaf weeds and perennial grass weeds, but they also can be used for annual grassy weeds if a preemergence herbicide was not used or failed to control the weeds. Postemergence weed control is most effective when the weeds are young and actively growing, and when the soil is moist and the temperature is warm. The grass should be healthy and actively growing except when applications are made to weeds in dormant turf.

Postemergence chemicals are applied to the foliage of growing weeds. Avoid mowing for 2 to 3 days before and after applying so there is more weed foliage to absorb the chemical and translocate it to the roots. Apply the product when rain is not expected for 24 hours after application. Also avoid watering for 24 hours after applications.

Do not apply postemergence chemicals to turfgrass while it is under heat or drought stress. Water the turf thoroughly prior to application. Most postemergence chemicals should not be applied when the temperature exceeds 85 to 90°F during and after application.

Controlling Annual Grass Weeds After Germination

Although preemergence chemicals are the most effective means of controlling annual grass weeds, they can be controlled after germination with a postemergence product. Most preemergence chemicals are not effective on weeds after they have emerged from the soil.

Control of annual grass weeds is more difficult and less effective after they germinate. The primary annual grass postemergence chemicals are the organic methyl arsonates such as MSMA and CMA. They are usually labeled as crabgrass killer and are sold in the liquid form under various brand names. They are most effective on young, seedling weeds and only slightly effective on mature weeds.

MSMA and CMA usually discolor the turf temporarily and can severely damage the turf if used at excessive rates. Applications have to be repeated after 1 to 2 weeks. The grassy weeds are killed slowly over a long period of time.

Using Postemergence Annual Grass Weed Control:

- Weeds should be small and actively growing.
- Do not mow 2 days before and after application.

- Soil should be moist before and after application.
- Air temperature should be above 70°F, but below 90°F.
- Do not apply to turf that is under stress.
- Repeat applications are required at 1- to 2-week intervals.
- Be careful not to exceed the label rate.
- Rain or watering within 24 hours after application will reduce effectiveness.
- Expect temporary discoloration of desirable grasses.

Controlling Perennial Grass Weeds

Most perennial grass weeds cannot be controlled without also killing the turfgrass. Some perennial grass weeds are turfgrasses that are undesirable in another kind of grass. Examples are Bermudagrass in tall fescue lawns or tall fescue in a zoysia lawn.

The undesirable perennial grass usually must be eradicated along with the turfgrass. The desired turfgrass is then replanted to the area. Glyphosate (Roundup or Kleenup) or Finale are nonselective herbicides that can be used for this purpose. Several applications may be required, and the weedy grass must be actively growing when control begins. The turfgrass can be planted 7 days after the last application.

Glyphosate or Finale can be used on dormant Bermudagrass, buffalograss or zoysia to eliminate cool-season grasses in late February or early March. These products are nonselective, so the desired warm-season grass must be completely dormant (no green undergrowth). Apply the product on a warm day when there is no wind to avoid damage to nearby trees, shrubs and other ornamental plants.

Weeds that cannot be selectively controlled

bentgrass	redtop
nimblewill	rough bluegrass
orchardgrass	silver beardgrass
quackgrass	tall fescue*
	windmillgrass

*Commercial applicators have access to a product that selectively controls tall fescue in a Kentucky bluegrass lawn.

Selective Bermudagrass Control: Is It Possible?

Fusilade II (fluazifop) is labeled for Bermudagrass control in fescue and zoysia lawns. We have limited experience with

Fusilade II for this use, so its effectiveness at achieving complete kill of an established Bermudagrass infestations is uncertain as of this writing. When Fusilade II is used on fescue, spring and fall applications are necessary because the fescue may be excessively damaged by applications in hot weather.

Controlling Broadleaf Weeds

Chemicals for broadleaf weed control must be used carefully to avoid damage to desirable landscape and garden plants. Desirable plants are especially susceptible to damage from spray drift in the spring. Avoid spraying on windy days.

Broadleaf herbicides are available in liquid, granular, fertilizer-herbicide combinations, and ready-to-use spray cans and bottles. Granules and fertilizer combinations should be applied when the weed foliage is wet. Other forms should be applied to dry foliage.

The most effective control results when the weeds are small and actively growing. The soil should be moist and the air temperature between 65°F and 80°F for best results. The product should not be washed off for 24 hours after application for full control. Avoid mowing for a few days before and after application. Never apply broadleaf weed killers to turf that is under severe heat or drought stress.

Broadleaf weeds can be controlled in the spring, summer or fall, depending on their growth cycle. Cool-season weeds such as chickweed, henbit, and dandelion should be sprayed in the fall for better control and less risk to desirable plants.

Examples of Retail Trade Names for Common Postemergence Broadleaf Herbicides

2,4-D + MCPP	Ortho Weed-B-Gon Weed Killer
2,4-D + MCPP + Dicamba	Ace Lawn Weed Killer
	Acme Trimec Lawn Weed Killer
	Fertilome Weed Out Lawn Weed Killer
	Super K-Gro Broadleaf Weed Killer
	Spectracide Lawn Weed Killer
	Trimec
triclopyr	Turflon
	Ortho Weed-B-Gon Chickweed, Clover and Oxalis Weed Killer

Safety of postemergence herbicides to turfgrasses

	Bluegrass	Tall fescue	Perennial ryegrass	Bermudagrass	Zoysia-grass	Buffalograss
2,4-D	T	T	T	T	T	I
2,4-D + MCPP	T	T	T	T	T	I
2,4-D + MCPP + Dicamba	T	T	T	T	T	I
Triclopyr	T	T	T	D	D	D

T = tolerant

D = damaging; do not use unless injury can be tolerated.

I = intermediate in tolerance; use only after buffalograss has fully greened up or in the fall; expect temporary discoloration.

Effectiveness of Broadleaf Weed Controls

	2,4-D	2,4-D + MCPP	2,4-D + MCPP + Dicamba
Bindweed	G-F	G-F	G
Chickweed	NE	G	G
Clover	F	G	G
Dandelion	G	G	G
Dock	F	F	G-F
Garlic, wild	G-F	G-F	G-F
Ground ivy	P	F	G-F
Healall	G	G	G-F
Henbit	P	F	G
Knotweed	NE	G-F	F
Lambsquarters	G	G	G
Mallow	P	G-F	G-F
Medic, black	NE	F	G
Onion, wild	F	F	G
Oxalis	NE	P	P
Plantain	G	G	G
Puncturevine	G-F	G-F	G-F
Purslane	F	F	G-F
Shepherd's purse	G	G-F	G
Sorrell, red	NE	G-F	G
Speedwell	P	P	P
Spurge	F	F	G-F
Thistle	G-F	G-F	G
Violet, wild	P	P	P
Yarrow	F	P	G-F

G = Good control

F = Fair control; repeated application or higher rates needed.

P = Poor control.

NE = Not effective

Note: Even though a particular weed is listed on a product label, it may not be highly effective or provide the desired level of control. Repeat applications may be necessary.

Triclopyr is a new postemergence broadleaf weed herbicide for homeowners. It is very effective on clover, violets and some other hard-to-kill broadleaf weeds. Unfortunately, it is fairly weak against dandelions. It is sometimes combined with 2,4-D to compensate for this deficiency. Broad efficacy data for triclopyr is lacking; so it is not included in the above table.

Special Weed Problems

Sandbur is a warm-season annual grass weed that produces sharp, spiny burs. It is difficult to control and hard to recognize before the burs form. There is no satisfactory control after the burs form except hand removal.

Sandbur germinates a few weeks after crabgrass but to be safe, a preemergence herbicide should be applied at the normal time for crabgrass. Only a few preemergence herbicides are labeled for sandbur. Special label rates or repeat applications, or both, must be used for sandbur control. Pendimethalin (Scott's Halts), Surflan, and XL are the best choices for preventative sandbur control. Note that Surflan and XL cannot be used on Kentucky bluegrass. These products must be watered in within 3 days after application using ½ inch of water or more.

Sandbur also can be controlled in the seedling stage of growth. Repeat applications with MSMA are effective on seedlings. Professional lawn care companies have access to other postemergence products that are very effective on sandbur.

No product will make the burs disappear once they have formed. Burs formed in previous years remain on the soil surface, creating a nuisance. Again, hand removal is the only solution.

Nutsedge, often called nutgrass, is a member of the sedge family. It is neither a grass nor a broadleaf weed. Nutsedge can be recognized by its triangular-shaped stem. Although classified as a warm-season perennial, it begins growth early in the growing season.

Nutsedge can be one of the most difficult lawn weeds to eradicate. It forms nutlets about the size of a kernel of wheat in the soil. The nutlets grow new plants and will also produce seed if not mowed. Hand removal of mature plants is not effective because the nutlets remain in the soil.

Manage (halosulfuron) is a new nutsedge herbicide that is much more effective than those used in the past. Light infestations can often be controlled with one application. Heavier infestations may require a repeat application of Manage. Manage is labeled for all Kansas lawn species except buffalograss.

MSMA and Basagran (bentazon) can also be used for nutsedge control, but eradication of nutsedge with these herbicides usually requires two or three applications per year for several years. Manage, MSMA, and Basagran are available only in the liquid form.

Buffalograss is a native prairie grass that presents special weed problems when grown as a turfgrass. Buffalograss is native to western Kansas where there is less than 25 inches of yearly rainfall. Under these conditions it is able to compete with weeds. However, when it is over-watered or over-fertilized, or both, it is unable to compete with weeds. Windmillgrass and silver beardgrass are serious weed problems in buffalograss that cannot be selectively controlled. Grass sandbur is also a serious problem in buffalograss.

The first defense against weeds in buffalograss is to avoid excessive watering and fertilizing. See the K-State Research and Extension publication, *Buffalograss Lawns*, MF-658, for tips on buffalograss lawn care. Several preemergence herbicides are now labeled for use on buffalograss. For postemergence control of cool-season grasses or broadleaf weeds, Glyphosate (Roundup, Kleenup) or Finale can be used on completely dormant buffalograss in late February or early March. Be sure there is no green undergrowth even though topgrowth is brown.

When buffalograss is greening up in the spring, it is especially sensitive to 2,4-D. Many broadleaf weeds can be sprayed in the fall while the buffalograss is dormant. MSMA can be used for grass weed control during the growing season, but temporary discoloration of the buffalograss should be expected.

Helpful Weights, Measures and Conversions

Liquid measures

- 3 teaspoons = 1 tablespoon
- 2 tablespoons = 1 ounce
- 1 cup = 16 tablespoons = 8 ounces
- 1 pint = 2 cups = 16 ounces
- 1 quart = 4 cups = 2 pints = 32 ounces
- 1 gallon = 16 cups = 8 pints = 128 ounces

Dry weights

- 1 ounce = 28.35 grams
- 1 pound = 16 ounces = 453.6 grams

Area measurements

- 1 foot = 12 inches
- 1 square foot = 144 square inches
- 1 yard = 3 feet = 36 inches
- 1 square yard = 9 square feet
- 1 acre = 43,560 square feet

Solid measures to liquid measure (Density of powdered chemicals may vary, and may affect measure)

- 1 pound powdered chemical = 1 quart
- 1 pound powdered chemical = 1 pint
- $\frac{1}{4}$ pound powdered chemical = 1 cup
- 1 ounce powdered chemical = 2 ounces liquid measure

Converting to small quantities

Liquid

Amount per 100 gallons	Amount per 1 gallon
$\frac{1}{4}$ pint	$\frac{1}{4}$ teaspoon
1 pint	1 teaspoon
1 pints	1 teaspoons
3 pints	3 teaspoons
1 quart	2 teaspoons
1 gallon	2 tablespoons

Dry

Amounts per 100 gallons	Amount per 1 gallon
pound	teaspoon
1 pound	1 teaspoon
2 pounds	2 teaspoons
3 pounds	1 tablespoon
4 pounds	1 tablespoons
6 pounds	2 tablespoons

Approximate application equivalents

- 1 pound per 1,000 square feet = 43.6 pounds per acre
- 0.37 ounces per 1,000 square feet = 1 pound per acre
- 10.4 grams per 1,000 square feet = 1 pound per acre
- 2.5 pounds per 1,000 square feet = 100 pounds per acre

Matthew J. Fagerness

Turfgrass Specialist

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned.

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Kansas State University Agricultural Experiment Station and Cooperative Extension Service

MF-2385

January 2001

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