HORTICULTURAL

MU Guide

PUBLISHED BY UNIVERSITY EXTENSION, UNIVERSITY OF MISSOURI-COLUMBIA

Home Lawn Watering Guide

Erik H. Ervin, Brad S. Fresenburg and John H. Dunn,
Department of Horticulture

As much as 80 percent of the water used around the home during summer is for outside uses. Watering the lawn is the main outside water use. During dry summers, local water authorities may cut off water for outside use or only allow watering on certain days. Both measures are necessary and effective means to reduce water consumption and relieve the strain on city water supplies.

To avoid severe loss of turf and to conserve water, homeowners should manage their lawns each year in anticipation of water restrictions.

This guide offers cultural practices that will reduce the need for irrigation while improving the competitiveness and appearance of your lawn.

Quick facts on lawn watering

- Lawns in Missouri may require as much as 1 to 1½ inches of water per week from irrigation or rainfall during summer to remain green and actively growing.
- When managed properly, tall fescue requires 25 percent less water and zoysiagrass requires 50 percent less water than Kentucky bluegrass to maintain a green, actively growing lawn in Missouri.
- Turfgrasses in Missouri rank as follows in resistance to leaf wilting and browning during summer dry periods — buffalograss, bermuda, zoysia, tall fescue, Kentucky bluegrass, perennial ryegrass.
- During extended periods of summer drought, dormant lawns (browned-out leaves) containing Kentucky bluegrass, tall fescue or perennial ryegrass should receive 1½ inches of irrigation every two weeks to maintain hydrated grass crowns and allow for full lawn recovery when more favorable moisture and temperature return in the fall.
- Deeper roots draw moisture from a larger volume of soil and therefore require less supplemental irrigation.
- Taller grass has deeper roots and a lower tendency to wilt.
- Taller grass provides shading of the soil surface and reduces lethal temperatures near the base of grass plants.
- Lawns mowed weekly at a taller mowing height are less likely to be scalped. Scalped lawns lose density and have shallow root systems.

Learn to read a lawn and know when to water

Purple-blue wilting leaves, footprints that stay, and folded or rolled leaves are signs that lawns should be thoroughly watered if grasses are to remain green and actively growing.

Turf water use rates are high during sunny and windy days with low relative humidity. In situations where lawns are not watered and rainfall is limited, grasses first show symptoms of wilt and later turn completely brown.

When soil lacks moisture, grass blades first turn bluish purple, indicating plant wilt.

Another early sign of insufficient water in the plant occurs when footprints remain in the lawn for several hours. Leaves with plenty of water quickly return to their rigid upright shape, while leaves lacking water will remain trampled for a period of time.

Leaves also may be folded or rolled lengthwise along the blade, indicating a lack of plant water.

If high temperatures and dry conditions continue without rain or irrigation, the above-ground portion of grasses will turn entirely brown and die. Grasses are said to be dormant during this browned-out stage, since the lower portion of the plant usually remains alive but not growing. Thorough watering will bring the lawn out of dormancy and new growth will resume from the below-ground base of grass plants.

Even though grasses are dormant, watering restrictions that result in extended dry periods can cause large ground cracks, severe soil drying, and excessive loss of turf cover even when watering is resumed later in the summer or early fall.

Summer dormancy of grasses is a mechanism that helps a lawn survive, but it does not guarantee that a lawn will fully recover from the browned-out stage.

Dormant lawns should receive at least 1 inch of

water every two or three weeks during summer to prevent complete turf loss. Grasses may not show a noticeable greening, but that amount of irrigation should be sufficient to hydrate the lower plant portions and increase the recovery once adequate moisture is available.

Wet wilt is another type of wilt to look for. Wet wilt occurs when the soil is obviously wet, but the root system is not able to keep pace with the water demands from the atmosphere. The curling of leaves from wet wilt looks very similar to wilt caused by lack of soil moisture. Waterlogged lawns that have a shallow root system are susceptible to wet wilt. Do not add more water when lawns are wilting and soil moisture appears to be adequate; it will only aggravate the problem by starving the root zone of oxygen.

Prepare for a drought

Management practices in the fall and spring determine the drought tolerance of the lawn in summer. To reduce the need for irrigation, your lawn management program should maximize root volume and depth in preparation for summer drought. By the time summer rolls around, there is little you can do to help a lawn except mow and irrigate properly.

The following lawn care tips will help reduce the need for irrigation and increase the chance of surviving summer drought.

1. Avoid the temptation to irrigate in spring just to get grass growing. Allow it to green up naturally. Mow frequently and avoid scalping. Do not begin to irrigate until dry conditions of early summer cause obvious turf wilt that lasts for more than one day.

In the spring, atmospheric water demands are low and moderate wilting of turf does not damage the lawn. If in the spring the soil is allowed to dry slightly and the grass to wilt some, a deeper and more hardy root system will develop. Such a root system will be necessary to reduce the need for summer irrigation and to survive drought conditions or when city water restrictions are imposed.

2. Mow grass as tall and as frequently as possible with a properly sharpened blade to produce a dense cover with a deep root system. Taller grass has a deeper root system that draws moisture from a larger volume of soil and results in less need for irrigation.

Grass height should never be less than 2½ inches after mowing. Mow frequently enough so that clippings are 1 to 1½ inches long. Raise the mower height if grass has grown too tall since the previous mowing. A lawn mowed at heights of 3 to 3½ inches will have a better chance of surviving prolonged drought and water restrictions.

Most homeowners mow lawns once a week regardless of the mowing height. Taller mowing heights are less likely to cause turf scalping, especially when grass leaves are rapidly growing in the spring. Dull mower blades and scalped turf result in an unattractive lawn that too many homeowners try to correct with over-irrigation.

3. Apply nitrogen fertilizer to cool-season grasses (Kentucky bluegrass, tall fescue and perennial ryegrass) primarily in the fall.

Some nitrogen may be applied in the spring if the lawn is sparse and bare soil is visible. Avoid summer application of nitrogen. Nitrogen fertilizer applied in the spring and summer causes additional leaf growth, which uses stored plant energy that normally would be used to produce roots needed for water uptake during summer.

4. Test the soil to ensure an adequate amount of phosphorus and potassium. Additional applications of potassium — 1 pound of K_2O per 1,000 square feet — in April and again in May or June will also improve the summer performance of lawns.

5. Core aerify tight soils and thatched turf in the fall or spring to increase water and air movement into the soil. This builds better root systems. Avoid summer coring in the absence of water, since it may cause excessive drying and drought stress.

6. Limit thatch removal by power raking or verticutting to fall or early spring or fall, since water demands are low and turf recovery is rapid. Do not severely power-rake lawns in the late spring or summer or they will require excessive irrigation to remain alive. When necessary, severe power raking and seeding should be done in September.

7. Select grasses that require less summertime irrigation to remain attractive. Zoysia is a warm-season grass and tall fescue is a cool-season grass. Both are noted for the ability to make an attractive summer lawn with less irrigation.

Select a sprinkler that best fits your needs

Automatic irrigation systems with pop-up sprinklers are often associated with excessive irrigation. This is not necessarily true, since properly designed and operated systems supply water uniformly over an entire area without wasted runoff.

Missouri soils generally have low water infiltration rates. Automatic controllers can be set to supply several short cycles so that the total amount of water desired is supplied without runoff.

The most common type of watering occurs with hose-end sprinklers. Some studies have shown that the average homeowner applies 2.5 times the amount of water that is required for turf growth when using hose-end sprinklers.

There are several types of hose-end sprinklers (see Figure 1). Select one that best fits your size and

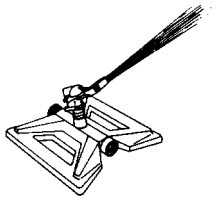
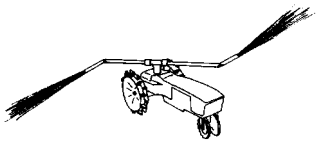
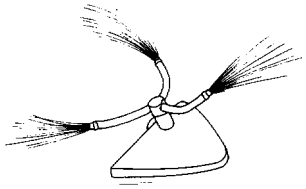
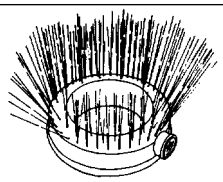
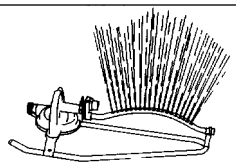
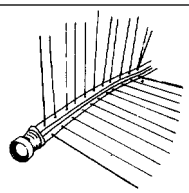
Sprinkler type	Comments
Rotary or impulse 	Rotary head shoots water out in a pulsating action. Some have adjustable screw or paddle that breaks up jet stream and disperses water pattern. Can be set to water partial circles. Best for large areas. Accurately distributes water when placed in an overlapping triangular pattern.
Traveling 	Path guided by hose placement. Traveling action covers a large area without assistance. Requires level ground and overlapping pattern to evenly distribute water. Used primarily on large lawns. Can easily be manipulated for large irregular lawn shapes. Wheel drive types are not suitable for newly seeded lawns where soft soil conditions result in stuck sprinklers.
Whirling-head 	Deposits largest amount of water closest to spray head. Use a 50 percent overlapping pattern. Deposits larger amount of water in short period of time and requires frequent movement. Good for watering tight locations.
Stationary 	Water applied in irregular pattern even with overlapping moves. Difficult to water large areas uniformly. Good for spot-watering tight locations. Deposits a large amount of water in a short period of time and requires frequent movement.
Oscillating 	Delivers water in a rectangular pattern. Deposits most of the water near sprinkler head. Difficult to achieve even water pattern on large areas that require sprinkler relocation. Can be adjusted to water smaller rectangular areas and other tight locations.
Soaker hose 	Flat pin-holed hose sprays fine streams of water. Requires several moves to water medium-sized lawn. Delivers water slowly — good for hard-to-wet locations. Can be manipulated to water irregular areas and long tight areas along house or walks.

Figure 1. Some sprinkler types and their applications.

shape of lawn and then operate it efficiently. All hose-end sprinklers can be attached to inexpensive timers that can be used to shut off unattended sprinklers and avoid over-irrigation.

How much water to apply

Once you have decided on the best sprinkler for your size and shape of lawn, you must decide how long to operate a sprinkler in a certain location. This is best achieved by knowing how many inches of water your system puts out in a certain amount of time. To do this, place shallow, straight-sided containers (tuna cans work well) or rain gauges in a grid pattern around the sprinkler. Operate the sprinklers (use overlapping patterns where needed) for a given amount of time and measure the amount of water captured (see Figure 2).

Measure the depth of water in the cans with a ruler or read directly from the rain gauges. Then use the following example to determine your water application rate in inches per hour. For example, a sprinkler that delivers a quarter-inch of water in 45 minutes has a delivery rate of one-third of an inch per hour.

An alternative approach would be to measure the area that your sprinkler pattern covers and the length of time it takes to fill a 1-gallon container directly from the sprinkler. For example, a sprinkler that covers 235 square feet and takes 1 minute and 15 seconds to discharge 1 gallon of water has a delivery rate of one-third of an inch per hour.

In the above examples, sprinklers should be operated approximately three hours in each location to supply 1 inch of irrigation water per week.

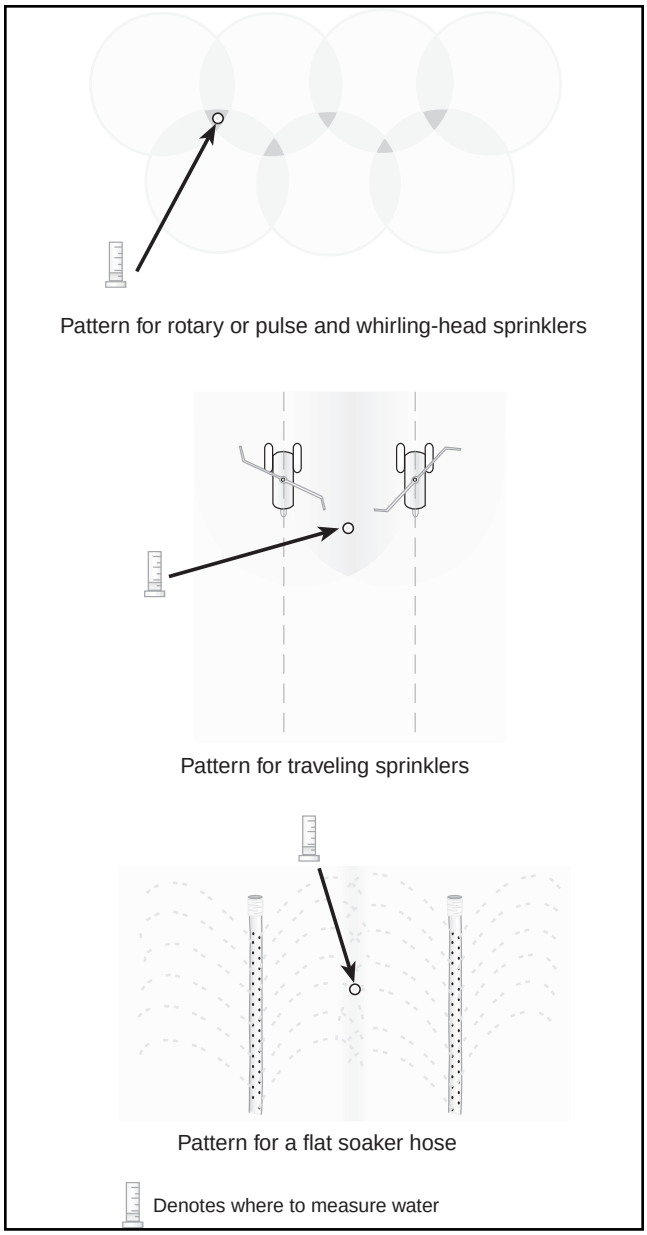


Figure 2. Proper sprinkler pattern overlap of 50 percent.

Most soils in Missouri will take in only about ½ inch of water per hour. If your sprinkler system delivers more than that amount, move it to a different location more frequently, after each time ½ inch of water has been applied. Repeat the process until the full amount of water desired has been applied.

Rotary sprinklers that are set to deliver a half or quarter sprinkler pattern will discharge two or four times the amount of water on a given area. Operate rotary sprinklers with half patterns for half the amount of time and sprinklers with quarter patterns for one-quarter the amount of time.

The utility water meter connected to your home can also be used to check how effectively water is being applied. It accurately measures water in cubic feet. When no other water is being used in the home, water a known area for a set amount of time and use these conversion factors to determine your water application rate. Some helpful facts to have are:

- 624 gallons (83.3 cubic feet) of water are required to apply 1 inch of water on 1,000 square feet of lawn.
- 7.48 gallons = 1 cubic foot of water.

Once the decision has been made that a lawn has sufficiently wilted and irrigation is needed, supply enough water to last a week. Depending on the type of sprinkler and soil water infiltration rate, several sprinkler changes may be required over a two- or three-day period to supply the amount of water desired.

If no rainfall occurs, continue to irrigate on a weekly schedule. If rainfall occurs, delay the next irrigation until symptoms of wilt are present. Even though water application is discussed on a weekly basis, it is not crucial that water be applied every seven days. Keep the application schedule flexible and irrigate based on the determination of lawn wilting and soil moisture.

Use Table 1 to determine the amount of irrigation that will be needed for your lawn situation.

Table 1. Approximate lawn water requirements.

Lawn type	Green turf[1] (inches of water per week)	Dormant turf[2] (inches of water per week)
Perennial ryegrass	1.5	1.0
Kentucky bluegrass	1.2	0.7
Tall fescue	0.8	0.5
Zoysia or bermuda	0.5	0.2
Buffalograss	0.3	0.2

[1]Lawn remains green and growing.
[2]Lawn may turn brown, but will not die.

Once the decision has been made to irrigate, use the above recommendations to guide irrigation scheduling and how much water to supply. Should puddles or runoff occur before the total amount of water is applied, stop irrigating and resume only after the ground has absorbed the free moisture. Lawn areas that are moist, firm and have no visible water are ready for a repeat irrigation cycle. Areas that are soft and produce squashy footprints when walked on are not ready to receive additional irrigation.

A day after watering, check a few different locations in the yard to determine how well your irrigation program is distributing water in the root zone. With a shovel, cut a slender 2-inch wedge 6 to 8 inches deep. This wedge of soil, roots and turf can be replaced easily without damage to the lawn after inspection.

Estimate the moisture content at different depths in the soil profile by pressing together a golf-ball-sized amount of soil. If drops of water can be

squeezed from the soil ball, you may be irrigating too much or too often. Soils that hold together without crumbling and appear moist have been irrigated properly. Soils that appear dry, dusty and do not form a ball when squeezed have not received enough irrigation or the water is running off the surface of the lawn and not into the root zone.

Adequate soil moisture at 6 to 8 inches deep is sufficient to maintain grasses during the summer. A foot-long slender screwdriver pushed into the ground in several locations can also give a quick assessment of the moisture condition of the soil. The screwdriver will easily penetrate to the soil depth that has received sufficient water. The screwdriver test can also be used to help determine where and when there is a need for irrigation.

Conserve water by knowing when to water

1. The best time to water a lawn is from 6 to 8 a.m. During this time the water pressure is highest, disruption of the water pattern from wind is low, and water lost to the atmosphere by evaporation is negligible. Watering early in the morning also has the advantage of reducing the chance of turf diseases that require extended periods of leaf moisture. Avoid irrigation during midday and windy conditions.

2. Move sprinklers frequently enough to avoid puddles and runoff. Difficult-to-wet areas such as slopes, thatched turf and hard soils may benefit from application of a wetting agent to improve surface penetration of water.

3. Water only when the plant tells you to. Become familiar with areas of the lawn that wilt first (blue/purple leaves, rolled leaves, foot printing). Water within a day of observing these symptoms.

4. Water problem areas by hand to postpone the need for irrigation of the entire lawn. Some areas of a lawn usually wilt before others. These areas, or "hot spots," may be caused by hard soils that take up water slowly, slopes, southern exposures and warmer areas next to drives and walks. Lawns that have unusual shapes also may require some hand watering to avoid unnecessary watering of paved surfaces, mulched beds and buildings. Soaker hoses that have a narrow pattern and supply water at a slow rate may be useful in these areas.

Watering new lawns

Newly seeded or sodded lawns require special irrigation. A newly seeded lawn should be watered daily and may need as many as four light waterings in a single day. Keep the seedbed moist, but not saturated, to a depth of 1 to 2 inches until germination occurs (green cast to lawn and seedlings are ¼ to ½ inch tall).

Seedlings of a new lawn must not be stressed to the point of wilt. Continue with light applications of water — ⅛ to ¼ inch — one to four times a day.

Apply straw (one bail per 1,000 square feet) at time of seeding to help shade the ground and prevent rapid drying of the soil surface. Straw also will reduce seedling damage from the force of large sprinkler drops. Watering with a light mist is best for establishing new lawns. As seedlings reach 2 inches in height, gradually reduce the frequency of watering and water more deeply. After the new lawn has been mowed two or three times, deep, infrequent waterings are the best.

Newly sodded lawns require watering one or two times a day. Begin irrigation immediately after laying sod. Plan your sodding operation so that a section of laid sod can be watered immediately, while other areas are being sodded.

Sod should be watered so that the sod strip is wet as well as the top inch of soil below the sod. The first irrigation will take about an inch of water to achieve complete wetting of the sod. After watering, lift up pieces of sod at several locations to determine if it has been adequately irrigated. Continue watering one to two times a day with light irrigations to prevent wilting and to ensure a moist soil just below the sod layer.

As sod becomes established and roots penetrate and grow in the soil, gradually reduce the frequency of watering but wet the soil deeper. After sod has been mowed two or three times, deep, infrequent watering should be practiced. During hot, windy conditions, establishing sod may require several light mistings per day to prevent wilt and potentially high lethal temperatures. In this case, light misting, just to wet the leaf surface and not to supply water to the soil, cools the grass plant as water is evaporated from the leaves.

Do not over-irrigate (saturate) the soil because that will inhibit sod roots from growing into the soil. If the sod cannot be watered on a daily basis, thoroughly water the sod and soil to a depth of 6 inches. This will delay the rooting time of sod but will reduce the chance of rapid drying and severe loss of grass.

Summary

Good lawn care practices save water and harden turf in preparation for dry periods or local lawn watering restrictions. Taller mowing and fall nitrogen fertilization develop a hardy and efficient root system that reduces the need for supplemental irrigation.

Irrigation schedules should be kept flexible and associated with identification of lawn wilting. Choose a sprinkler that best fits your lawn size and shape. The amount of water a sprinkler applies should be determined to accurately water lawns. Newly seeded or sodded lawns require daily irrigation during establishment.

OUTREACH & EXTENSION
UNIVERSITY OF MISSOURI
COLUMBIA