

Irrigation Rates and Frequencies for Western and Eastern Oregon Turfgrass

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Key topics

- Irrigation rates and frequency based on turfgrass species selection, soil type and evapotranspiration (ET) rates.
- Appropriate turfgrass genus and species for your geographical region.
- Regional variations in soil type and evapotranspiration rates.
- Turfgrass species evapotranspiration replacement requirements.
- Best timing of irrigation applications.

Introduction to turfgrass species

When trying to minimize irrigation inputs, the best turfgrass species for the Oregon climate include perennial ryegrass (*Lolium perenne*) in Western Oregon, Kentucky bluegrass (*Poa pratensis*) in Central/Eastern Oregon and tall fescue (*Schedonorus arundinaceus*) in Western, Central or Eastern Oregon.

Bentgrass, including creeping, colonial, velvet and highland are well-adapted to areas of little or no irrigation. However, they typically are not planted in lawns because of heavy thatch accumulation and lower mowing height recommendations.

Fine fescue is well-adapted to low fertility and shady environments. It is capable of persisting with little or no irrigation. Still, it requires the most frequent summer irrigation to prevent visible drought stress and summer dormancy (straw-brown turfgrass) from developing.

All of these turfgrass species can be maintained without irrigation in Western Oregon if summer dormancy and the presence of drought-tolerant weeds

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Figure 1: Regularly irrigated turfgrass (left) compared to unirrigated turfgrass (right) in Corvallis, Oregon in 2019.

like dandelion, crabgrass and spurge is acceptable (Figure 1). In Central/Eastern Oregon, irrigation will be required for turfgrass to persist.

Perennial ryegrass

Residents of Western Oregon, where winter weather is cool and wet, will likely prefer perennial ryegrass. Perennial ryegrass is a fine-textured turfgrass species that provides a dark green, visually pleasing lawn when maintained with frequent mowing, fertilization and regular irrigation (Figure 2). Perennial ryegrass may be injured in Central/Eastern Oregon because of its poor cold tolerance.

Kentucky bluegrass

For high-quality, aesthetically pleasing lawns in Central/Eastern Oregon, Kentucky bluegrass is the best turfgrass species. During periods of snow cover, Kentucky bluegrass goes dormant. But it recovers in the spring with an aggressive, rhizomatous growth habit. When maintained with frequent mowing, fertilization and irrigation, this species provides a lush, dark-green lawn capable of recovering well from foot traffic. In

Western Oregon, however, it is susceptible to cool-weather pathogens, and will not persist as a major component of the lawn.

Tall fescue

Tall fescue provides a drought-tolerant option for those hoping to use less water. Tall fescue is adapted to warm weather and does well in the summer months with minimal irrigation. Its deep root architecture helps tall fescue tolerate droughts.

A mowing height of 3 inches encourages deeper rooting. It is well-adapted to low fertility levels. Breeding has improved the texture of tall fescue, but its leaves are coarser than perennial ryegrass and Kentucky bluegrass, and often will not achieve the visual aesthetics these species possess (Figure 2).

In Western Oregon, tall fescue tends to go semidormant in the winter and is susceptible to leaf spot (*Pyrenophora dictyoides*) and Microdochium patch (*Microdochium nivale*) diseases, especially the first winter after planting. Because of its weak rhizomatous growth habit, tall fescue persists in Eastern/Central Oregon and may be an option for those who want to save water.



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Figure 2: Turfgrass species from fine to coarse leaf texture, left to right: fine fescue, perennial ryegrass, Kentucky bluegrass and tall fescue, Corvallis, Oregon.



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Figure 3: Irrigation applied at ¼” depth four times per week (left) and irrigation applied at 1” once per week (right), Sept. 3, 2019, Corvallis, Oregon.



Soil characteristics

While the species plays a large role in the amount of irrigation required for turfgrasses, soil also plays a critical role. Sandy soil, for instance, drains water faster than clay soil.

The type of soil affects irrigation frequency, but not total amount. Sandy soils need to be watered more frequently, but with less water with each application. Excessively watering a sandy soil allows water to move beyond the root zone of the grass. Knowing the texture of a soil is critical for making effective, long-term irrigation schedules.

Soils in Western Oregon are often high in clay content, hold onto water longer and drain slowly. Irrigation can be less frequent on these soils.

Conversely, soils in Central/Eastern Oregon typically have less clay and more sand. These soils have low water-holding capacity, drain rapidly and require more-frequent irrigation.

To assess your soil’s composition of sand, silt and clay, consult the USDA Natural Resource Conservation Service’s Web Soil Survey at <https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>. If more accuracy is required or you believe native soil may not be present because of a recent construction project or soil renovation, a sample can be collected and sent to the OSU Soil Health Laboratory for assessment at <https://cropandsoil.oregonstate.edu/shl/soil-testing-osu>

Evapotranspiration and precipitation

The loss of water from a vegetative canopy to the atmosphere — also known as evapotranspiration, or ET — and precipitation are major factors to consider when developing an irrigation program. In summer when

precipitation is minimal, irrigation is required to keep turfgrass green.

Different turfgrass species require different irrigation amounts. For instance, research conducted in Western Oregon determined that fine fescues (slender creeping red, strong creeping red and Chewings) require the most water — 58% to 96% ET replacement — to achieve high quality. Kentucky bluegrass requires 45% to 50% ET replacement, perennial ryegrass requires 32% to 49% and tall fescue requires 26% to 43%. Evapotranspiration rates increase as summer temperatures increase. Because Oregon receives very little summer rain, turfgrasses depend on irrigation for ET replacement.

In Western Oregon, irrigation typically begins in late May, when annual precipitation rates dwindle. Irrigation should peak in July when ET rates are highest (Table 1). In Eastern Oregon, irrigation should be initiated in early April, with peak application in June and July. In both regions, irrigation may be reduced or discontinued in September when ET rates decrease. Local ET and precipitation data are available at the Bureau of Land Management’s Pacific Northwest Region AgriMet website at <https://www.usbr.gov/pn/agrimet/>.

Irrigation rates and frequencies

Cool-season turfgrass species are inherently shallow-rooted and in Oregon require relatively frequent irrigation to prevent summer dormancy. In Western Oregon, irrigate twice per week for tall fescue and every two to four days for perennial ryegrass. Apply a quarter-inch to half-inch of water to maintain green color in the summer (Figures 3 and 4). In Western Oregon, fine fescues will require irrigation every other day or daily. Apply a quarter-inch to half-inch of water to maintain acceptable green color during peak drought stress.

In Central and Eastern Oregon, irrigation frequency should be increased to compensate for sandy soil, prolonged periods of low precipitation and higher ET rates. Tall fescue in Central/Eastern Oregon will require irrigation several times per week. Kentucky bluegrass will require frequent (sometimes daily) irrigation in June and July. Fine fescues will require daily irrigation throughout the summer months to prevent dormancy.

Irrigation timing

The best time to irrigate is at dawn; few people are using the landscape and wind levels are likely at their lowest.

As temperature and wind increase, irrigation efficiency decreases. Irrigating at dawn also provides the plant with water and sunlight at a relatively cool time of day for maximum photosynthesis.

Summary points

- Irrigation requirements vary greatly according to turfgrass species, soil type and ET rates across the state of Oregon.
- Turfgrass is inherently shallow-rooted, so one-quarter to a half inch of water should be applied per application. Apply irrigation to cool-season turfgrass at relatively frequent intervals to prevent summer dormancy.
- In Western Oregon, turfgrass can be maintained without irrigation if summer dormancy and weed encroachment is acceptable. However, summer irrigation is necessary for turfgrass to persist in Central/Eastern Oregon.
- Tall fescue will require the least frequent irrigation and lowest ET replacement, and will grow well in all areas of the state.

- Perennial ryegrass in Western Oregon requires irrigation every two to four days depending on the month.
- Kentucky bluegrass in Eastern Oregon will require frequent irrigation to prevent summer dormancy.
- Fine fescues will require the most frequent irrigation and greatest amount of ET replacement to prevent drought stress.

Resources

Blankenship, T., J. Lambrinos, L. Brillman, A. Kowalewski, R. Golembiewski, B. McDonald and C. Mattox. 2020. Water requirements influenced by turfgrass species and mowing height in Western Oregon. *Crop Forage and Turfgrass Management*. doi.org/10.1002/cft2.20020.

Bureau of Reclamation. 2020. AgriMet. <https://www.usbr.gov/pn/agrimet/>.

USDA Natural Resource Conservation Service. 2020. Web Soil Survey. Retrieved May 5, 2020. <https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

Olsen, C., A. Cain, M. Gould and A. Kowalewski. 2019. Optimizing Irrigation Rates and Frequency for Perennial Ryegrass in Western Oregon. *Crop Forage and Turfgrass Management*. doi.org/10.2134/cftm2018.11.0094.

OSU Central Analytical Laboratory. 2020. Submitting Your Sample. Oregon State University, Crop and Soil Sciences. Retrieved May 5, 2020. <https://cropandsoil.oregonstate.edu/cal/submitting-your-sample>



Photo: Alec Kowalewski, © Oregon State University

Figure 4: Irrigation application rate of a ½" depth, determined using a rain gauge, Corvallis, Oregon.

Table 1: Average monthly evapotranspiration (in inches) in Western Oregon and Central/Eastern Oregon

Bureau of Reclamation figures retrieved in 2020 from AgriMet, <https://www.usbr.gov/pn/agrimet/>.

Western Oregon	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Total
Astoria	1	2.3	4	4.8	5.8	4.8	2.9	1.3	26.9
Bandon	1.4	2.2	3	3.8	3.9	3.1	2.5	1	20.9
Brookings	1.4	2.8	3.4	4.5	3.7	3	2.9	2.4	24.1
Corvallis	1.2	3.2	5.3	6.9	8.6	7.7	4.6	2.3	39.8
Forest Grove	1	2.6	4.4	5.3	6.8	5.5	3.1	1.3	30
Medford	1.3	3.1	4.9	6.5	7.7	6	4	2	35.5
Central/Eastern Oregon	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Total
Baker	0	1.8	4.5	5.4	6.9	6.3	3.8	0	28.7
Christmas Valley	0.1	5.1	5.1	6	7.4	6.2	4.1	0	34.1
Hermiston	1.5	6.8	6.8	8	9.2	8.5	6.5	2.5	49.9
Klamath Falls	0.1	5.4	5.4	6.6	7.7	6.7	4.3	0	36
Madras	0.5	5.2	5.2	7.5	8.5	7.6	4.6	0.8	40
Ontario	1.8	6.3	6.3	7.7	9.3	7.8	5.3	1	45.4

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