

## Drought and General Water Conservation Practices for Landscape Management

### Description

Manage landscapes using the most water-efficient techniques during drought conditions.

*This BMP has been adapted with only minor modifications from “Coping with Drought: Water Restrictions and the Landscape” by Patrick McCarty, Colorado State University Cooperative Extension Agent, Garfield County, and Dr. Curtis E. Swift, Area Extension Horticulture Agent, Grand Junction, as posted on*

[www.colostate.edu/Depts/CoopExt/TRA/PLANTS/drought.html](http://www.colostate.edu/Depts/CoopExt/TRA/PLANTS/drought.html). This guidance will continue to be updated as conditions change.

*Note: At the time of publication of this BMP Manual, Colorado was experiencing a drought. Many web sites and publications are available with specific guidance for drought. The information selected from McCarty and Swift (2002) has been reproduced in this manual because it provides a good overview of practices appropriate for drought consistent with the BMPs included in this manual.*

### Basic Practice Guidelines

#### Turfgrass Irrigation Practices

1. Base the first watering on soil moisture content. Spring is the time of maximum nutrient uptake. Watering too early in the spring cools the soil and reduces nutrient uptake. This stresses the grass and makes it more susceptible to insect and disease problems. Early spring watering can also saturate the soil, reducing the oxygen available to deeper roots, which results in the death of these deep roots. The loss of deep roots increases the grass's susceptibility to drought stress, and increases the need for more frequent waterings.
2. Check the moisture content of the soil with a trowel, shovel or soil probe to a depth of 4 to 6 inches for turf areas and 6-8 inches for trees and shrubs. If the soil is dry, water. If the soil is moist, delay watering.
3. Irrigate according to the requirements of the plants, not on a fixed schedule. Apply only enough irrigation to replace water loss by evapotranspiration (ET). Match irrigation application rate to the soil type and root depth. Avoid applying more water than can be contained in the root zone. Daily observation is necessary to determine the appropriate changes to make to the irrigation system. ET controller technology is also available that can be added to irrigation controllers to more easily water according to ET requirements.

BMP Type			
Design			X
Installation			X
Maintenance/Operations			X
Green Industry Relevance			
ASLA	X	GCC	X
ALCC	X	ISA	X
CALCP	X	RMSGGA	X
CGGA	X	WFC	
CNA	X		

4. When turfgrass requires water, it will:
  - Turn darker than normal (it appears as if a shadow is cast on the lawn).
  - Turn blue-gray.
  - Not spring back when walked on (depressions left by footprints do not bounce back).
  - Prevent the blade of a screwdriver or other such implement from easily penetrating into the soil any deeper than 2 inches.
5. Drought symptoms can appear in patches or over the complete turf area. When only small areas exhibit drought stress, water only those areas that need to be irrigated. Watering the complete lawn when only a small area requires water, or watering too frequently, results in shallow roots, increased susceptibility to drought (especially during the hot and dry days of July and August), and increased susceptibility to Melting-out Disease (Leaf-spot Disease).
6. Water deeply but only as needed; avoid shallow frequent waterings. Watering a lawn on a frequent, shallow basis results in death of deep roots, increasing the need to water.
7. In some instances, it may be necessary to water daily or every other day. This is especially true if the soil is very sandy as this soil texture dries out quickly. Turf on a shallow soil will likewise require more frequent irrigation. Soils should always be amended with a good quality organic matter such as compost. This will help hold the soil moisture and reduce the need for frequent irrigation.
8. Water at night to reduce water loss from evaporation. Watering during the heat of the day can result in excessive levels of evaporation. Watering during the night (particularly after midnight) reduces problems with turf diseases and reduces the amount of water lost from evaporation, making the irrigation more efficient.
9. The most efficient and ideal time to irrigate turfgrass is between midnight and 6 A.M. Such timing, however, is difficult for all but those gardeners with an automatic sprinkler system. Gardeners not wishing to spend their night hours watering should consider watering during the day after the night moisture has been burned off by the morning sun, but prior to 10:00 A.M. Lawns should not be watered between the hours of 10:00 A.M. and 6:00 P.M. For further information on watering lawns, go to:  
[www.coopext.colostate.edu/TRA/PLANTS/lawnwat.html](http://www.coopext.colostate.edu/TRA/PLANTS/lawnwat.html).
10. To reduce water loss from evaporation, do not water during windy times. Wind will also divert the water, resulting in some areas getting much more water than others, and leaving dry spots. Areas of the turf that do not receive adequate moisture will require more water to stay alive.

## Irrigation System Maintenance

11. Check, adjust and repair irrigation equipment on a regular basis, weekly and within 24 hours of mowing, whenever possible. Identify irrigation system leaks and repair them promptly.
12. Spring is a great time to check the irrigation system for consistency, uneven water coverage, and leaks. Place straight-sided cans or glasses in the area to be irrigated. Turn the sprinkler system on for a set length of time and measure the amount of water collected in the containers during that time. Using containers to measure the amount of water applied will pinpoint any variation in water distribution in the irrigated area. Plugged heads, improper spacing of sprinkler heads, etc., can be identified and subsequently corrected using this method. For information on self-auditing irrigation systems, see <http://www.ext.colostate.edu/pubs/garden/07239.html>.
13. The amount of water applied and the depth of water penetration should be rechecked occasionally during the summer months to avoid problems that develop from clogged or twisted heads. Reset or clean heads as necessary.
14. Immediately shut off irrigation systems and adjust whenever irrigation water falls or runs onto hard surfaces such as sidewalks, streets or driveways. Signs of leakage include overgrown or particularly green turf areas, soggy areas around spray heads and above-ground hoses, jammed spray heads and torn hoses. In drip systems, leakage problems may be due to damaged tubing from foot traffic or gnawing by animals.
15. Whenever possible, update and retrofit existing irrigation systems to take advantage of new water-saving technology (e.g., rain shut-off devices, ET controllers, soil moisture sensors, drip irrigation).
16. Manage the irrigation system to respond to the changing/seasonal requirements for water in the landscape. The most efficient systems match irrigation application to landscape water requirements through effective irrigation scheduling. Whenever possible, irrigation scheduling should incorporate the use of evapotranspiration (ET) and precipitation data.
17. Reset automatic controllers according to the seasonal needs of plants. Controllers should be inspected at least bi-monthly to correct run times.
18. *See the Irrigation Efficiency, Design, Installation and Maintenance BMPs of this Manual for more detailed guidance.*

## Lawn Aeration

19. Aerate the lawn in the spring and again in the fall to obtain these benefits:
  - Improving water penetration into compacted soils and through thatch and mat layers.
  - Improving fertilizer movement to the turf roots.

- Allowing greater levels of oxygen to reach the soil in exchange for carbon dioxide and other gases.
- Enhancing turfgrass shoot and root development.
- Reducing water runoff (runoff from turf areas may carry pesticide residues and fertilizers into neighboring storm drains and streams causing pollution problems).

20. Use core-type aerators to loosen the soil, rather than spike-type aerators, which compact it.

### **Turfgrass Maintenance**

21. Kentucky bluegrass can be allowed to go dormant without permanent and excessive injury if healthy. This is a worst-case scenario option if drought conditions persist. Watering properly when restrictions are lifted will allow Kentucky bluegrass to recover. Kentucky bluegrass can recover even after nine months without water.

22. If unsure what grass is in the lawn, take a sample to the local Colorado State University Cooperative Extension office or local garden center for identification.

23. Weeds always seem to thrive regardless of the conditions and use water intended for other plants. Do not allow uncontrolled weeds to overtake the lawn or garden. Apply the proper methods necessary to prevent weed growth such as hand-pulling or careful herbicide application.

24. Carefully inspect the lawn at least weekly for disease and pests, correcting problems as they occur. During a year of potential high stress from drought, this becomes even more important. Early detection and control of problems is essential.

### **Fertilizer Application**

25. Conduct a soil test to determine the nutrient needs by sending a soil sample to a reputable soil-testing laboratory. (For more information on soil testing go to: [www.coopext.colostate.edu/TRA/PLANTS/soiltest.html](http://www.coopext.colostate.edu/TRA/PLANTS/soiltest.html).)

26. A properly fertilized lawn requires less water. Applying more fertilizer than is needed can deplete other nutrients and cause deficiencies. Excessive quantities of nutrients are often as detrimental as deficiencies. Adding excess may adversely affect the availability of other nutrients that were previously in sufficient supply. For example, adding too much phosphorus may result in a deficiency of available iron both within the soil and within plants grown in the soil. Nutrient-stressed plants with deficiencies are more susceptible to insect and disease problems, as well as drought stress.

27. Generally, for low-maintenance bluegrass lawns (common throughout Colorado), apply one pound of nitrogen fertilizer per 1,000 sq. ft. in the fall and fertilize lightly (one-half pound/1,000 sq. ft.) in the spring and again in early summer. (*See the Fertilizer Application BMP of this Manual for more detailed guidance.*)

28. Avoid the use of manure as top-dressing on lawns; applying manure can increase the need to water. Gardeners applying manure as a top dressing assume (incorrectly) that this meets the nutrient needs of the turf. Manures are very low in nitrogen with several inches of manure being necessary for each pound of nitrogen needed by the turf. Manures are typically high in salt. Adding salt to a lawn increases the need to apply more water.

### **Mowing**

29. Mow the lawn at a height of 2 ½ to 3 inches, removing no more than one-third of the grass blade at each mowing. The higher the lawn is mown, the deeper the roots (as long as the soil was prepared deeply).

### **Landscape Installation**

30. If establishing a new lawn, prepare the soil properly; this will increase rooting depth and spread and increase drought tolerance of the grass. Proper soil preparation means the addition of organic matter and tilling the soil as deep as possible. Add 3 to 5 cubic yards of a decomposed organic matter per 1,000 square feet of lawn. Use a coarse, not a fine material. Cultivate the soil to a depth of 4 to 6 inches or more. While root depth is controlled in part by genetics, the depth of soil preparation determines the ultimate rooting depth. Shallow soil preparation causes shallow roots.
31. Because of limited water supplies, delay expanding the lawn or garden space. Small grass areas (turf islands) that are difficult to water, and the parts of the lawn that are not doing well may be candidates for change. Consider transforming these areas into drought-tolerant gardens. Always consider the use of xeric trees and shrubs (plants that are drought resistant or require less water) when planning new garden areas. Make sure to change the irrigation system accordingly.
32. For a great selection of xeric plants compiled by the Colorado State University/Denver Botanic Gardens Plant Select® program, go to: [www.plantselect.org](http://www.plantselect.org).

### ***Key Drought-Related Web Sites and Other References for Up-to-Date Information***

City of Colorado Springs Utilities. 2004. Colorado Springs Utilities Xeriscape Web Site: [www.csu.org/xeri](http://www.csu.org/xeri).

Colorado Climate Center. 2004. Web site: [ccc.atmos.colostate.edu](http://ccc.atmos.colostate.edu).

Colorado Division of Water Resources Flow Data. 2004. Web site: <http://www.dnr.state.co.us/water/indexWater.asp>.

Colorado Office of Emergency Management: Drought Monitoring. 2004. Web site: [PublicInformation/Drought](http://PublicInformation/Drought).

Colorado State University Cooperative Extension Drought Task Force. 2004. Web site: [www.drought.colostate.edu/](http://www.drought.colostate.edu/)

- Colorado State University. 2004. CSU Turfgrass website:  
<http://csuturf.colostate.edu/Pages/extensionfactsheets.htm>.
- Colorado Water Conservation Board. 2004. Web site: [cwb.state.co.us](http://cwb.state.co.us).
- Colorado Water Resources Research Institute. 2004. Web site: [cwri.colostate.edu](http://cwri.colostate.edu).
- Colorado Water Wise Council. 2004. Web site: [coloradoet.org](http://coloradoet.org).
- Denver Botanic Gardens and Colorado State University Cooperative Extension. 2004. Plant Select® Web site: [www.plantselect.org](http://www.plantselect.org).
- Denver Water. 2004. Denver Water Conservation and Xeriscape Web sites:  
[http://www.denverwater.org/cons\\_xeriscape/cons\\_xeriscapeframe.html](http://www.denverwater.org/cons_xeriscape/cons_xeriscapeframe.html) and  
[www.watersaver.org](http://www.watersaver.org). Also Denver Water brochures.
- Feucht, J.R. and C.R. Wilson. 2003. *Xeriscaping: Retrofit Your Yard*. Fact Sheet No. 7.234.  
([www.ext.colostate.edu/pubs/garden/07234.html](http://www.ext.colostate.edu/pubs/garden/07234.html)) Ft. Collins, CO: Colorado State University Cooperative Extension.
- Klett, J., Vickerman, L. and C. Wilson. 2004. *Flower Management Before, During and Following Drought*. Web site:  
<http://www.greenco.org/downloadables/Drought%20Flower%20Management.pdf>.
- Koski, T. 2003. *Winter/Spring (2003) Lawn Management for Colorado Lawns*.  
(<http://csuturf.colostate.edu/Pages/summer2003lawnCARE.htm>). Ft. Collins, CO: Colorado State University Cooperative Extension.
- Mecham, B.Q. 2003. *Conservation Strategies for Lawn Watering During Drought or Water Shortages* ([http://www.ncwcd.org/ims/ims\\_info/Irrigation\\_Strategies.pdf](http://www.ncwcd.org/ims/ims_info/Irrigation_Strategies.pdf)).
- National Drought Mitigation Center, University of Nebraska—Lincoln. 2004. The National Drought Mitigation Center Web Site: <http://www.drought.unl.edu/index.htm>  
[www.enso.unl.edu](http://www.enso.unl.edu).
- Northern Colorado Water Conservancy District. 2004. Web site: [www.ncwcd.org/](http://www.ncwcd.org/).
- U.S. Bureau of Reclamation. 2004. Water Supply Information Web site:  
[www.usbr.gov/main/watersupply](http://www.usbr.gov/main/watersupply)
- U.S. Department of Agriculture. 2004. Colorado Snow Survey Web site:  
[www.co.nrcs.usda.gov/snow/snow-index](http://www.co.nrcs.usda.gov/snow/snow-index).
- U.S. Department of Agriculture. 2004. SNOTEL (Snowpack Information) Web site:  
<http://www.co.nrcs.usda.gov/snow/data/basins.html>.
- U.S. Geological Survey. 2004. USGS National Water Conditions Web site:  
[water.usgs.gov/nwc](http://water.usgs.gov/nwc).

U.S. Geological Survey. 2004. USGS Real Time Stream Flow Conditions for Colorado Web site: [waterdata.usgs.gov/co/nwis/rt](http://waterdata.usgs.gov/co/nwis/rt).

Water Information Program. 2004. Web site: [www.waterinfo.org](http://www.waterinfo.org).

WaterSaver.Org. 2004. WaterSaver.Org. Web site: [www.watersaver.org](http://www.watersaver.org).

Wilson, C.R. and D. Whiting. 2003. *Operating and Maintaining a Home Irrigation System*. Fact Sheet 7.239. (<http://www.ext.colostate.edu/pubs/garden/07239.html>). Ft. Collins, CO: Colorado State University Cooperative Extension.

Xeriscape Colorado! Inc. Xeriscape Colorado! Inc. 2004. Web Site: [www.xeriscape.org](http://www.xeriscape.org).