

# The Cemetery Landscape

## Preparing for and surviving a drought

by Michael Trinkley and Debi Hacker

The December 2007 Seasonal Drought Outlook produced by the Climate Prediction Center of the National Weather Service predicted that the current drought in the Southeast will persist and spread to encompass the Gulf Coast and all of Florida. Although they expect some areas of improvement, especially in Idaho, western Montana and Nevada, the drought may spread into northern and southern Texas.

In the face of reduced rainfall and increasing restrictions, what can historic cemeteries do to protect their landscape and minimize the long-term effects? Some have simply given up and are allowing the landscape to degrade. Perhaps never fully committed to careful management, the drought offers a few managers an excuse to do even less.

Other cemeteries, however, are aware of their ethical, social and preservation responsibilities and are attempting to find procedures and approaches to keep the landscape alive, if not green.



When grass is allowed to grow tall and then closely mowed, as in this case, additional stress is placed on the grass as it attempts to recover.



Even shrubbery can succumb to drought. Intervention is necessary to prevent the need for costly replacements. None of these shrubs were appropriately mulched.

### Conditioning

The best approach is to select appropriate plantings, avoiding those with high water demands and selecting those that are more drought resistant, and conditioning plantings to less water.

Selecting plantings can be controversial. Not only do some people feel strongly about particular plants and their association with cemeteries, but you must consider the effect on the historic landscape if you seek to radically alter the types of plantings used in a historic cemetery. Conditioning plants, however, is very valuable and can be almost universally applied.

Conditioning begins with proper irrigation. Too often irrigation (whether manual or automatic) applies too little water too often. This encourages shallow root systems that

quickly dry out. The better approach is less frequent, longer irrigations. This will establish a deep, viable root system.

Another aspect of turfgrass conditioning involves mowing practices. Every time turf is mowed, the metabolic activities of the grass are stressed, reducing root growth. Use the highest cutting height permitted for your turfgrass; it increases leaf area and increases root depth. Mowing should still be done frequently enough to minimize the shock of cutting and no more than one-third of the height of the leaf blade should be removed in any mowing. Keeping the mower blades sharp improves turfgrass health—the leaf blades can heal over more quickly than when torn, and this reduces water loss after mowing.

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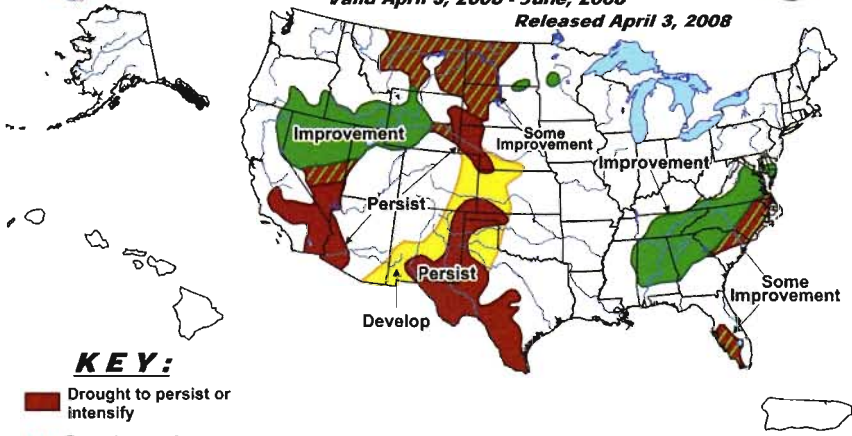


# U.S. Seasonal Drought Outlook

Drought Tendency During the Valid Period  
Valid April 3, 2008 - June, 2008



Released April 3, 2008



## KEY:

- Drought to persist or intensify
- Drought ongoing, some improvement
- Drought likely to improve, impacts ease
- Drought development likely

Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Short-term events -- such as individual storms -- cannot be accurately forecast more than a few days in advance. Use caution for applications -- such as crops -- that can be affected by such events. "Ongoing" drought areas are approximated from the Drought Monitor (D1 to D4 intensity). For weekly drought updates, see the latest U.S. Drought Monitor. NOTE: the green improvement areas imply at least a 1-category improvement in the Drought Monitor intensity levels, but do not necessarily imply drought elimination.

COURTESY OF NOAA/NATIONAL WEATHER SERVICE

This map shows the U.S. Seasonal Drought Outlook for the beginning of 2008.

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Even fertilization can enhance drought tolerance. Everything done to promote plant survivability can be defeated by excessive nitrogen fertilization. The nitrogen enhances shoot growth at the expense of root growth. The leaves become more lush, but there is an insufficient root system to provide the moisture necessary to support this lush growth. Potassium, however, may be of assistance in reducing stress. It promotes increased root growth and thicker cell walls.

Increasing the amount of organic matter in your soil will improve soil structure by increasing the soil's ability to hold moisture and nutrients. Compost, manure, leaf mold and peat moss are excellent choices for soil amendments. They are often added as topdressing after core aeration, or can be added to planting beds during preparation. Remember that organic matter should be added on an annual basis because of microbial breakdown.

Taking these steps prior to a drought can help your cemetery plantings survive. If you're not in a drought currently, there is still time to begin assessing how you can implement steps to improve your turfgrass and other plantings.

## Surviving the drought

For those in a drought, survival is more complicated. Conditioning steps

are still useful—avoid poor irrigation practices, mow correctly and fertilize intelligently.

Although relatively few cemeteries have irrigation, spot irrigation is often necessary for reseeding/resodding graves or rejuvenation of lawn areas. An excellent source on irrigation management is provided by The Irrigation Association and is available at [www.irrigation.org/gov/pdf/ia\\_liswm\\_march\\_2005.pdf](http://www.irrigation.org/gov/pdf/ia_liswm_march_2005.pdf). The EPA has also developed a certification program for irrigation specialists designed to promote appropriate water use. More information on that program can be found at [www.epa.gov/watersense/specs/cert.htm](http://www.epa.gov/watersense/specs/cert.htm).

Water should never be applied at a rate that exceeds the infiltration capacity of the soil to prevent runoff (typical on slopes, where thatch has built up or where turf is being grown on compacted soils). Where infiltration is slow, bump irrigation should be used, applying part of the water, allowing it to infiltrate, and repeating the process.

As mentioned before, irrigation should be thorough and deep, but as infrequent as possible. One simple way to test for this is the use of a soil core. If water has not penetrated to the desired depth (the rootzone) by six to eight hours after irrigation, then the next irrigation time should be increased. If water has moved well beyond the desired depth, then the next irrigation time should be

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decreased. During drought, it is appropriate to spot water. It is also typically necessary to provide more irrigation to full-sun areas and less to shady areas.

The most efficient time to water is between 10 p.m. and 8 a.m. During the night and early morning hours it is generally less windy, cooler and more humid—resulting in less evaporation and more efficient use of water. The North Carolina Cooperative Extension points out that contrary to popular belief, irrigation during this period does not stimulate disease development in turfgrass.

Although always good practice, it is particularly important during a drought to ensure that irrigation systems work properly. Repair leaky pipes, connections, valves and heads immediately. Ensure that only plantings are being irrigated—not asphalt and concrete.

Core aeration is another method to maximize irrigation (or natural rainfall), since it aids in efficient water penetration, especially in compacted soils. Pay equal attention to soil pH (typically recommended for most plantings to be between 5.5 and 6.5), as this, too, will reduce plant stress. Healthy, thick turfgrass serves as its own protector, reducing soil evaporation. Thin turf, with much exposed soil, encourages the soil to dry quickly, causing additional stress. For other plants, practice good mulching, this can significantly improve the health and survivability of plants during drought. Mulch applied around the base of the shrubs and trees keeps the soil moist by preventing rapid evaporation. Mulch can also reduce the soil temperature, allowing roots near the soils surface to remain healthy and active. An organic mulch has the added advantage of enriching the soil as it decomposes (keep in mind, however, that many mulches decrease soil nitrogen levels as they decompose).

Mulch should not be placed against the main stems or trunks of plants, but should be kept a minimum of 1 to 2 inches away from the main stem or trunk of the plant. In addition, mulch should never be applied to a depth of over 2 to 3 inches. Mulch should be periodically replaced, not added to. During replacement, areas of slime mold or fungal mats should be raked out.

You should strive to minimize potential problems from pesticides that are toxic to root systems, especially certain preemergent herbicides. Of course, herbicides present additional problems in many cemetery contexts because of their salt content and its effect on monuments.

## Trees and drought

In many historic landscapes the trees are the most prized—and difficult to replace—planting. Typical irrigation systems are not well adapted to promoting tree survival (although drip irrigation is an exception). Drought damage may take several years to become apparent, although deciduous trees may develop leaf scorch, brown edges or browning between veins. Evergreen needles will turn yellow or turn brown at the tips. Leaves may drop prematurely or remain attached to the tree, even though brown.

Trees require deep water, usually a depth of 12 inches below the soil surface, extending outward from the trunk to the outer edge of the tree's branches (called the drip line). For evergreens, watering should extend an additional 3 to 5 feet outward from the drip line. In each case, the goal is to water slowly, allowing the water to saturate deeply; short watering encourages shallow rooting that leads to more drought damage.

A general rule of thumb is to use approximately 10 gallons of water per inch of trunk diameter for each watering. In most systems, a typical garden hose will produce 10 gallons at medium flow in about 5 minutes. Thus, a 4-inch-diameter tree should receive 40 gallons of water and this can be accomplished with about 20 minutes of watering.

For new plantings, there are a variety of water bags that can be placed around the trunk of the tree. They slowly drip their contents, usually about 20 gallons, over a four to 24-hour period (the rate depends on the brand and the adjustment). Some have also suggested the installation of water pipes, perforated tubes driven into the ground at the sides of the planting hole. One quart of water applied using this technique is the equivalent of several gallons applied at the surface.

## Other technologies

The maintenance of historic cemeteries is typically underfunded, and






*This close-up of a cemetery lawn shows that the grass has already gone dormant, leaving the weeds both green and growing.*

this reduces the potential to introduce technologies that could offer significant preservation benefits. When examining costs of making technological changes, cemetery custodians should look at life cycle costs, not solely on up-front costs.

An excellent technology for many cemetery landscapes is drip irrigation or soaker hoses that are most often found for watering gardens, flowerbeds, trees and shrubs. Drip irrigation uses inline emitters that control water, applying it only to your plantings. Slow drip and deep root watering can save up to 60 percent of the water used for irrigation.

Originally, drip irrigation was not thought practical for turf areas. In recent years, however, independent researchers, such as those at the Center for Irrigation Technology (CIT) at California State University Fresno, have done enough testing that emitter lines are now being designed for many lawn areas. The primary benefit of subsurface irrigation is water savings. Because water delivery is below the soil surface, no water is lost from evaporation, runoff or overshooting lawn boundaries. While the practicality may be limited in cemetery settings, it may be appropriate for at least limited areas.

Another high-tech approach is the use of hydrophilic polymers (cross-linked acrylic copolymers) often called “water crystals.” There are a variety of brands available from garden suppliers, and their primary benefit is a dramatic increase in long-term water holding capacity of the soil. When mixed or tilled into the soil, the dry crystals absorb and retain water (most brands absorb up to 50 times their own weight in water) from irrigation or natural precipitation for extended periods. The crystals have a useable life of up to five years and are biodegradable.

Recently, pozzolans, or volcanic ash, have been found beneficial as soil amendments. They hold and release moisture readily, do not easily break down and result in little soil heave. Although most commonly used to improve sports fields (especially golf courses), they may also be beneficial in cemetery settings to reduce soil compaction and reduce drought damage. 

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