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ALABAMA A & M AND AUBURN UNIVERSITIES

## Conserving Water Xeriscaping: Landscape Design For Water Conservation

In recent years, some Alabama residents were asked to restrict their water usage during periods of summer drought. They saw firsthand how dependent plants are on water to survive and remain healthy and attractive.

Unfortunately, with increased land development and only a limited supply of usable water, restricted water usage could become a way of life.

How can landscape practices change or adapt to better water conservation? In this day of rising water costs and diminishing water supplies, people concerned about water use on their property can turn to xeriscaping—using landscaping and horticultural strategies that minimize water use.

Property owners can reduce their water use by one-third by following xeriscaping principles when planning, planting, and maintaining their landscape. In addition to cutting down on water use, xeriscaped gardens generally require less maintenance and are more resistant to drought during a dry summer than conventional gardens are.

Plant selection in a xeriscaped garden may vary from area to area, but there are seven basic principles that can be used everywhere:

- Group plants by similar water use, as well as appearance.
- If sites are dry, choose as many plants with low water requirements as possible, such as some of the ornamental grasses, barberries, Chinese hollies, and junipers.
- Reduce the amount of turfgrass area. Turfgrass is the largest water user in landscaping. Use it only where necessary or consider some of the newer, drought-resistant types.
- Use plenty of organic material (peat moss, pinebark, compost) in preparing soil.
- Use about 4 inches (no more) of mulch (wood chips, shredded bark). Mulch reduces water use by slowing evaporation, and it adds organic matter to the soil and helps prevent erosion.
- Use efficient watering systems.
- Prune, fertilize, and divide plants regularly.

### Before You Start: Conduct A Site Analysis

Site analysis is a crucial step in any landscape before you begin xeriscaping. Whether your landscape is new or old, a thorough investigation of your property can reveal ways of implementing water-saving practices. Simple site-specific information that would help you in planning for a more water-conserving landscape might include the following:

**Climate.** Angles of the sun at various times of the day (also note seasonal changes in sun angles).

**Wind.** Summer and winter wind patterns through the property.

**Microclimates.** Areas on the property that are warmer or cooler because of the orientation of the house and existing plants on the property.

**Rainfall.** Monthly amounts.

**Topography.** Slopes, rock outcroppings, flat or low wet areas; their orientation to the sun.

**Vegetation.** Type, location, and condition of existing trees, shrubs, lawn, and ground covers.

**Geology.** Drainage (surface and subsurface) and soil types. (A soil analysis can be extremely helpful. Request instructions from your county Extension agent.)

Armed with this information, you can design or redesign your landscape to be water-conserving and better adapted to your site conditions.

### Group And Select Plants

Plant selection is one of the most important factors in designing a successful drought-tolerant landscape. Along with concern about plant size, texture, and color, we must be concerned about how a plant will perform from an ecological and horticultural standpoint. Gardens that thrive for many years are those that use horticulturally sound principles like the following.

- Use only plant varieties that are well adapted to your locality and soil conditions. Poorly chosen varieties often need greater amounts of fertilizer and water just to stay alive.

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- Group plants with similar water needs together. For example, group the vegetables requiring more water together in the garden to make the most of water applications.

- Choose moisture-loving plants for wet, poorly drained sites and drought-tolerant plants for hotter or sunnier areas.

- Select and plant drought-tolerant varieties that require minimal amounts of water.

**Trees.** Certain species of ashes, oaks, ginkgo, hackberry, Japanese pagodatree, Japanese zelkova, Deodar cedar, Southern magnolia, Chinese pistache, lacebark elm, American holly, golden-rain tree, and pines are good tree selections.

**Shrubs.** Chinese and yaupon hollies, vitex, abelia, nandina, and junipers are excellent shrub selections.

**Flowers.** Mints, perennial salvias, and composites (like coreopsis, rudbeckia, and purple coneflower) are drought-tolerant. Composites are plants with ray and disk flowers arranged in dense heads that resemble single flowers.

**Ornamentals.** Many ornamental grasses and plants with succulent foliage (sedums, hens and chicks, and cacti) have low water requirements.

Plants grown in the shade use less water; consider using plants that do not need full sun. Plants that mature early (like spring-flowering bulbs) or late (like autumn-blooming crocus or lycoris where the foliage dies back in the summer) do most of their growing when water is plentiful.

### Reduce Turf Grass

In most suburban neighborhoods the lawn is the most prominent vegetation. This observation should come as no surprise. The aesthetics of an emerald green carpet, the physical benefits of erosion control and heat absorption, and a ground cover that will endure both passive and active recreation are benefits that only the lawn can provide.

When drought occurs, the lawn quickly and obviously becomes stressed. Indeed, of all outdoor consumers of water, the lawn is the main one. Reducing the size of the lawn and using common sense to establish, maintain, and manage it will reduce the quantity of water needed.

The question many homeowners should ask is, "Do I have too much grass?" The answer is yes if the homeowner is trying to grow grass under the following situations:

Are you trying to grow grass under the dense shade of shallow-rooted trees?

Are you trying to grow grass among and around your shrubs?

Are you trying to grow grass where maintenance is nearly impossible, such as on steep slopes, among rock outcroppings, or in that narrow space between the walkway and the house?

Are you trying to grow grass where active play tramples out all vegetation?

Are you growing grass just because you can't think of anything else to do with your property?

### Maintain Turf Properly

Once the lawn has been reduced to manageable proportions, it can be given the care and management it needs.

**Soil Test.** Take a soil test to determine the pH and fertilizer needs of your lawn. The ideal pH for turf is between 6.0 and 7.0. Alabama soils tend to be acid, so regular applications of lime are often necessary.

**Fertilizer and Lime.** Do not overfeed your lawn. Fertilizing three times per year is adequate for a healthy lawn. For a "lean lawn" it is possible to get away with only one feeding, which should be applied in mid to late November for cool season grasses and May or June for warm season grasses. Avoid late-spring fertilization on cool season grasses. Excess nitrogen in late spring promotes lush, succulent growth. The turf is then very susceptible to disease, insect, and drought injury. Ask your county Extension office for information on the fertility requirements of the grass you are growing.

Lime is even more important than fertilizer; in the acid soils of Alabama, several of the essential nutrients become unavailable to lawn grasses. Adding lime to raise the soil pH to between 6.5 and 7.0 not only makes these nutrients available, but also makes a lawn more drought-resistant.

**Weeds And Grubs.** Control weeds in your lawn. Weeds reduce the quality of the turf and compete with desirable turf species for precious water. Control beetle grubs. They destroy the root system of lawn grasses making it very difficult for your turf to survive soil moisture stress conditions.

**Mow.** Mowing height is also an important consideration during droughts. Cut the lawn no lower than 2½ to 3 inches during the summer for cool season grasses and 1 to 1½ inches for most warm season grasses. This mowing height is less stressful to turf than closer mowing, and longer turf shades the ground, conserving water.

**Water.** Water the lawn only when and where it needs it. Become aware of stress areas within the lawn, such as areas in competition with shade and shallow tree roots, and water them first. When a lawn doesn't recover quickly from foot traffic, it is a sign for watering.

The typical summer thunderstorm may provide  $\frac{3}{4}$  inch water. No watering should be necessary for a minimum of 4 days, so turn off automatic timers that control your underground sprinkler system. Remember that millions of acres of crops depend entirely on natural rainfall; watering is necessary only when rainfall does not occur for an extended period.

If natural rainfall is deficient, apply 1 to  $1\frac{1}{2}$  inches water once per week on heavy textured soils or  $\frac{1}{2}$  to  $\frac{3}{4}$  inch twice per week on light textured (sandy) soils. Once grass is established, it will tolerate more drought.

Water as infrequently as possible. Watering less frequently “teases” the roots to lower depth, making the turf more tolerant of stressful periods. Frequent watering keeps moisture near the surface, promoting the growth of shallow roots, which makes the plants less drought-tolerant.

Watering should be done only in the cool of the morning or when the lawn is in shade. On a windy, bright, sunny day as much as 40 percent of sprinkler-applied water is lost to evaporation.

Although mentioning it may seem unnecessary, sprinklers should be set to water the lawn, not the street, driveway, or sidewalks. Be aware that regular irrigation where water hits trunks of trees has been reported to cause crown rot and possible death of the trees.

### **Use Alternatives To Turf**

Aesthetic options to turf grasses provide visual variety to the landscape, are often easier to maintain, and require less water than turf grasses. Categories include organic mulches, inorganic mulches, and living alternative ground covers.

A bedline or mowing strip that separates the lawn from the shrub border can reduce maintenance problems. Mowing around tree trunks, shrubs, and clumps of herbaceous perennials is a time-consuming nuisance. It may also damage or kill the plant if a mower or weed eater wounds the plant.

To create a bedline, “draw” a smooth, flowing line with lime. Once you’ve drawn a satisfactory line, use a sharp spade to create a permanent bedline. Remove grass and weeds from the bed side of the cut. Cover the ground with organic mulches, inorganic mulches, a living ground cover, or some combination of these alternatives. Mowing strips with brick or some other paving material will reduce trimming and keep lines smooth.

### **Prepare The Soil And Plant Properly**

Planting your landscape using xeriscaping principles requires proper soil preparation.

In recent years, researchers have found that small to mid-sized trees have the best chance of becoming

established in the landscape. Smaller trees become established more quickly than large ones. Their roots spread throughout the soil and begin to absorb water more efficiently. A larger tree undergoes a much greater transplant shock than a small tree and does not begin to grow as quickly.

Fall is a very good time to plant deciduous trees and shrubs. Spring-planted trees are under the extra stress of supporting an emerging leaf canopy, with high nutrient and water demands. In fall, their energy can be devoted to establishing the feeder root system.

Avoid planting during periods of drought. Newly planted trees require water weekly. Take advantage of the natural rainfall in the fall or spring to provide most of the required water.

Prepare a planting hole that will encourage rapid spread of the root system into the surrounding soil. Dig out a broad, saucer-shaped depression two to three times the width of the root ball. By digging a wide hole, you encourage root spread. When planting, dig only a few holes at a time, and dig only as many holes as can be planted that day. Unplanted open holes lose available soil moisture.

There is no advantage to adding organic matter to backfill in the hole. However, use plenty of organic materials such as peat moss and compost in preparing an entire planting bed. By incorporating compost into the soil, you can improve the water-holding capacity and aeration of the soil.

Use a hose to trickle water into the hole and settle the backfill. This prevents the roots from finding dry pockets of air and soil in the early establishment period. Do not compact the soil around the plant with heavy pressure with your foot or tamper. You will lose the benefit you gained from loosening the soil.

After the hole has been filled, and if you are in a dry site, create a basin at the edge of the root ball to hold water while the plants get established. Fill it with water. If you are not on a slope or a well-drained site, do not create a basin. Too much water is as bad as too little water. Do not overwater newly planted trees and shrubs. A tree may wilt if the planting hole is constantly water-logged and oxygen depleted.

Finally, cover all newly planted trees and shrubs with a 2- to 4-inch layer of mulch. Use no more than 3 to 4 inches of mulch. Too much mulch can smother the roots. But properly used, mulches retain soil moisture and keep down competitive weeds.

Weed control is important for water conservation. Weeds will compete with desired plants for water and nutrients. A 2-inch layer of mulch is the best defense against weeds. Other methods of weed control in the home landscape include hand pulling, mechanical cultivation, and the selective use of herbicides.

## Use Mulch

Mulches conserve soil moisture by reducing evaporation from the soil surface. Mulches also control weed growth and reduce erosion and soil compaction run in.

Mulches are divided into two major groups: organic and inorganic.

**Organic Mulches.** Organic mulches include straw, leaves, manure, pine needles, leaf clippings, shredded bark, wood chips, sawdust, compost, composted sewage sludge, etc. A good organic mulch has the following qualities: it should retain moisture, retard weed growth, be free of weed seed, create an attractive neutral surface, improve the soil as it decays, and be inexpensive to acquire and maintain.

Peat moss, a popular mulch among homeowners, fails nearly all these criteria. Peat, as it dries, actually draws water from the soil, and the following year it provides an ideal seed bed for weeds. It can blow away, float away, and catch fire. Furthermore, peat moss is expensive. Peat moss should be used as a soil conditioner, not a mulch.

Wood chips or bark mulches are better. Shredded bark mulch products are also successful organic mulches. They mat together and are less likely to float away than chips. Bark nuggets, however, should be avoided where slopes are present. They are more expensive, they float, and they tend to be weedy. The one advantage of bark nuggets is that they break down more slowly than shredded bark mulches.

Organic mulches last one to three seasons and then must be replaced. Some types of organic mulch form a crust that inhibits water percolation. Periodically rake the mulch to break up any crust that has formed. Remove or incorporate decayed organic mulch into the soil before adding more mulch. Weed control using organic mulch can be enhanced if pre-emergent weed-control chemicals are applied to the soil surface prior to mulching.

**Inorganic Mulches.** Inorganic mulches provide a long-term ground cover. Inorganic mulches may range from pea-size gravels and river-worn cobbles to boulders. (If the gravel is too small, it will stick to the feet of pedestrians walking across it.)

A weed-control mat should be placed below the mulch. Use a mat that allows water to penetrate. Roots of plants under black plastic are closer to the surface and more susceptible to drought stress. The black plastic usually becomes exposed over time and becomes an eyesore.

Many homeowners develop a hatred for the native rocks that impede their horticultural endeavors, but once these “indigenous” rocks are washed down

with the garden hose they often make a very attractive rock mulch surface. Gravels may be purchased in many dyed colors, but natural colors blend best into the landscape.

Gravel is used more effectively in areas with evergreen shrubs or no plant material. Gravel is difficult to keep clean in deciduous tree and shrub areas. Gravel can also get scattered into lawns causing problems with mowers.

One type of mulch that is not only aesthetically offensive but may harm plant materials is white marble chips. Reflected glare hurts the eye and may cause leaf scorch. A marble chip mulch is especially damaging to rhododendrons and their kin. As the chips weather, soil pH is raised, causing iron deficiency (yellow leaves with green veins).

Cobbles, or naturally rounded stones, can be very useful as a ground cover. If no roof drains are present, these stones break up the force of splashing water. They also can be moved aside, creating planting holes for annuals. During the summer, flowers spread across the stones, creating color delights during the growing season. In the fall, after frost kills the annuals, the dead plants are pulled and composted. Then cobbles can be put back in place. Herbs, herbaceous perennials, and woody ground covers like junipers can also be successfully planted in the cobbles.

## Water Efficiently

Maintaining your landscape using xeriscaping principles includes an efficient watering system.

**Water Requirements.** Water according to the following recommendations if enough rainfall does not occur.

### *Shade Trees*

*Newly planted*—Water once per week.

*Established*—Water twice a month in summer and fall.

### *Evergreens*

*New planted*—Water weekly, especially into fall and winter.

*Established*—Water twice a month all year.

### *Shrubs*

*Newly planted*—Water 2 to 3 times per week for container plants then reduce to 2 times per week for the remainder of the growing season if no rain occurs.

*Established (3 to 5 years old)*—Water weekly during the growing season and twice a month in fall and spring.

### *Flowers*

*Newly planted*—Water 3 times per week.

*Established*—Water weekly during the growing season.

## Vegetables

*After planting seed*—Water lightly every other day until seedlings emerge.

*Established*—Water once a week during the growing season.

Many individual vegetables have critical periods of growth during which irrigation is absolutely essential. For example, cucumbers must have water from flowering through fruit development, and peppers require a steady supply of moisture from the seedling stage to maturity. However, once onions and muskmelons start to mature, water should be withheld.

## Grass

There are two cases when you must water grass in order for it to survive—new sod and newly planted seed. Water every day for the first week and every other day the second week or until the lawn becomes green.

*Established lawns*—Water when:

- a weekly rain of 1 to 1½ inches does not occur. A rain gauge measures the amount of water your garden receives and can be purchased at a local garden center.

- the lawn begins to show signs of wilting—when the grass does not spring back when you step on it—rather than on a regular schedule.

- the bright green “normal” lawn color turns dull green. Once your lawn turns brown, it is dormant and there is no need to water it. As long as you have not overfertilized or used too much herbicide, the lawn will go dormant when not enough water is provided and will turn brown. It will recuperate as soon as a steady supply of water is provided.

**Watering Methods.** Deep soakings that wet the soil to a depth of 5 to 6 inches are the most efficient way to water. This 4- to 6-inch penetration can be accomplished with about 1 inch of water. Deep soakings will encourage deep rooting. Light surface watering will encourage shallow rooting and turf that is more susceptible to drought. To determine the depth that is wet, probe the soil with a screwdriver or a probe that removes a soil plug.

If water is applied faster than the percolation rate of the soil, runoff will occur. In that case, water until runoff, allow the water to soak in and water again 1 hour later. Continue until the soil is wet to a depth of 5 to 6 inches.

It is best to water in the early morning or late afternoon when it is cool and less windy. Loss of water to evaporation will be less. Water your garden early in the morning when the water pressure is high, the plants aren't stressed from the rigors of the day,

and little water is lost from evaporation. For turf, water at night. Little evaporation occurs, and since the blades of grass are already wet from dew, the risk of disease is lowered.

If at all possible, avoid overhead sprinklers. Overhead sprinklers are 75-percent efficient whereas drip or subsurface irrigation is 90-percent efficient. Use an open hose at the base of small or newly planted shrubs and trees. For larger trees, spread a soaker hose over an area under the tree about as wide as the tree is tall. Put hoses on timers to avoid waste. Drip or subsurface irrigation systems are the most efficient ways to water landscape plants. If you must use overhead sprinklers, never use them on windy days and locate them so you avoid watering sidewalks and driveways. An alarm should be used to remind you to turn off sprinklers when you have applied enough water.

Try trickle or drip irrigation systems in outdoor gardens. These methods use 25 to 50 percent less water than hose or sprinkler methods. The tube for the trickle system has tiny holes for watering closely spaced plants. The drip system tubing contains holes or openings at strategic places for tomatoes and other plants that are more widely spaced.

**Guide To The Cost Of Watering.** Table 1 will allow you to estimate the quantity of water flowing from a typical 50-foot garden hose at the standard household water pressure of 40 pounds per square inch (psi). Longer hoses will decrease flows slightly. Higher pressures will cause greater flows.

**Table 1. Estimating The Flow Rate Of Water Through Hoses Of Different Diameters.**

Hose Diameter, in	Length, ft	Pressure, psi	Flow Rate, gal/min
½	50	40	5.0
⅝	50	40	6.4
¾	50	40	8.8

Source: Shelton and Hamilton, 1987.

To apply 1 inch of water to 1,000 square feet of lawn or garden requires 620 gallons of water. This takes 97 minutes water time, using the ⅝ inch hose from the table above.

$$620 \text{ gal} \div 6.4 \text{ gal/min} = 97 \text{ min}$$

The cost of water in Alabama ranges from approximately \$0.50 to \$3.25, with \$1.50 per 1,000 gallons being about average. Thus, 620 gallons cost approximately \$0.93. You can compute your watering costs using the formula below:

Number of square feet of lawn or garden x 620 gal per inch of water applied ÷ 1,000 sq ft x cost of

water in your town per 1,000 gallons ÷ 1,000 = total cost of watering

Example:

5,000 sq ft of lawn x 620 gal (1 in of water) ÷ 1,000 sq ft x \$1.5 ÷ 1,000 gal = \$4.65

Note: If your water is measured and sold in cubic feet, 7.5 gal = 1 cu ft, 1,000 gal = 133 cu ft, and 620 gal = 83 cu ft.

If sewer and water costs are combined in your city, a separate meter for irrigation will reduce your water bill.

### Prune And Fertilize Regularly

Many plants require more nutrients than can be obtained from the native soil for vigorous growth. Nutrients are added in the form of fertilizers. Most fertilizers include nitrogen, phosphorus, and potassium. It is best to fertilize perennial plants (trees, shrubs and lawns) in the fall or winter. A second application in early to mid June will encourage vigorous vegetative growth.

The addition of fertilizer (especially nitrogen) will encourage new growth. Too much nitrogen can encourage too much vegetative growth and reduction in flowering for some plants. In the spring, plants put the extra nutrients into increased top growth. New growth is undesirable just before a period of drought stress. In the fall, most plants put extra nutrients into root growth, which increases the plant's ability to

locate and take up water. Consequently, fertilize perennial plants in the fall.

### Conclusion

Please do your part to help conserve water and keep our landscape growing. You can make a difference.

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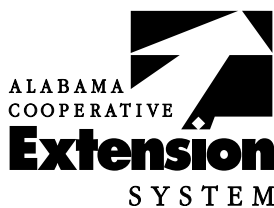
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**For more information**, call your county Extension office. Look in your telephone directory under your county's name to find the number.

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