Cooperative Extension University of California Ventura County

Landscape Notes

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Drought, "water-wise" gardens and saving water in landscapes.

Drought. Dry, no water! How do plants survive? In many ways, drought tolerance is a function not only of the plant and its adaptations to a dry climate, but where that plant grows, the depth and capacity of its root system and the soil in which those roots grow. As the summer grinds to a finish and fall is here, drought gets to be a recurrent topic. Even though we have had a record-breaking storm this October, most of California is still considered to be in drought. Water agencies are telling us to conserve, and in many cases telling water users how to conserve, i.e., no turfgrass," go native", tune up irrigation systems, use weather-based valve controllers. As the drought continues, water prices rise, and court actions limit water for use on farms, it seems that everyone has an opinion on how homeowners should use water. Curiously, homeowner water use is one of the smallest categories of fresh water use in California. There is an abundance of myth, misinformation and downright false information being spread by "authorities" large and small across California. Rather than attack the sources of poor information let's consider some commonly heard/read recommendations and then try to make some sense of them. In a following article, I will describe plant drought survival strategies.

Let's debug what we are constantly reading about water-wise gardening. Urban and home/landscape use of water is a small fraction of the entire water supply. According to the California Farm Water Coalition (http://www.westlandswater.org/short/200809/06_factbook.pdf), most fresh water (developed and undeveloped) in California is used to maintain environmental resources (48%) and agriculture (41%). Urban uses of developed water account for only 11% of the total. If you take out all the industrial, commercial and public uses of water, that leaves residential use at less than 5-6% of the state's developed water supply, and landscape irrigation is about 50% of the total residential use on a statewide basis. While homeowners saving water in their landscapes will reduce water consumption, it will likely not solve the state's water shortage problem because we just don't use that much water to irrigate landscapes statewide; even if we cut our usage by 50%, it would be a very small savings compared to the amount of water used in agriculture and for the environment. Should we conserve anyway? Certainly! Why? First, water is becoming increasingly expensive. Indoor usage is fairly fixed (given you have upgraded to low usage fixtures and appliances), but if we save on water use outside, it can lower our water bill or the bill of the customers we work for. Second, water is often over-applied in many residential and commercial landscapes leading to nutrient deficiencies and disease; therefore, conserving water will promote healthier landscape plants. Finally, less irrigated landscapes produce fewer clippings and thus less greenwaste that must be recycled or used back on the property, thus reducing landscape maintenance costs.

Some Misconceptions

You often hear the admonition, "native plants are best for our gardens--they save water and are less harmful to the environment." This is a very liberal interpretation of a narrow truth. First, what is a native plant? Native to where? California has more floristic provinces than any other state in our Union and thus more places and kinds of plants than most areas of the world. For example, coast redwood (*Sequoia sempervirens*), white alder

(*Alnus rhombifolia*) and sycamore (*Platanus racemosa*) are all California native plants and heavy water users because they are either native to wet climates, or riparian areas in dry climates. Thus not all "natives" are low water-using plants. Other plants from California are very drought tolerant (*Rhus ovata, Quercus agrifolia*) and require no additional water than the rainfall they receive in many areas of our state. Just because a plant is native to California does not make it drought tolerant or necessarily any more useful than an exotic ornamental if we are trying to reduce landscape water applications. Drought tolerant plants are available from other parts of the world with Mediterranean climates. Many ornamental plants are available from Europe, Australia and South Africa as well as the moderate elevations of the Andes mountains in South America and the Himalayan mountains of Tibet and Northern India. Drought tolerant plants also come from regions in China where there are similar rainfall patterns. We take these, drought-tolerant plants such as rosemary, olive, deodar cedar and eucalyptus for granted yet they can help us achieve water-wise gardening goals without being "native" to California. Use caution when selecting drought tolerant invasive exotics such as some eucalyptus, tree of heaven (*Ailanthus altissima*), or pampas grass (*Cortaderia selloana*) which can spread by seed and rapidly colonize an area if rainfall is adequate.

Another misconception is that some plants use way more water than others. In fact recent research suggests most established woody landscape plant species need about the same amount of irrigation in order to provide acceptable aesthetic and functional value. The most common plant with this bad reputation is turfgrass. Turfgrass does not use that much more water than other plants especially trees which probably use more on a square foot basis. The problem with turfgrass is the relatively shallow root system which is reliant on frequent applications of water. If these are not made in an efficient manner, then water is wasted. It is no mistruth that most lawn irrigation systems are very inefficient. Does that mean we should not have turfgrass in landscapes, NO! Just tune up the irrigation system, use turf only in areas of the landscape where its function is necessary (play areas and other areas where foot traffic occurs), make the surface that turfgrass occupies easy to irrigate (no steep slopes), then water will not be wasted. If turfgrass is already used in an inefficient manner, re-landscaping to increase efficiency may be needed. Not all turgrasses are in the same water using categories. Warm season grasses such as bermudagrass, kikuyugrass, zoysiagrass, buffalograss and others are lower water using than their cool season counterparts tall fescue, perennial ryegrass and kentucky bluegrass. Although warm season grasses do go dormant in many areas of our county they can be overseeded with other grasses in the winter when there is rainfall to sustain the cooler growing overseeded annual grass. Another way to save water with turfgrass is to have defined areas that are easy and efficient to irrigate. Placing turfgrass in parkway strips, next to trees and in small areas creates situations that are difficult to efficiently irrigate and water is wasted--because it often overshoots the turf and lands on hardscape.

Extensive use of turfgrass and high water using trees, Willow and Alder

A limited use of turfgrass and trees are planted in their own areas away from the turfgrass. Much more extensive use of hardscape (cement driveway) make this landscape less water consumptive.

So, How do we save the water???

Learn to read your water meter!

Water meters can be hard to read!

This meter is leaking around its gasket and is filled with condensed water, this makes it impossible to read the numbers above the needle. You have to wonder how the water company reads it!! Report faulty meters to your water company—errors reading meters are common.

The first step in learning about landscape water use is learning to read your water meter. Water companies make it kind of hard because water meters are calibrated in ccf or hundred cubic feet. Not your usual water measurement. Gallons or inches of water are easier to use but we can easily convert from ccf to gallons or inches of water. There are 748 gallons in a hundred cubic feet of water and there is a simple formula to convert gallons to inches of water. There are many kinds of meters and every single one of them is covered in dirt, spiders and debris. When you go out to check your meter, bring a rag to wipe it off (Conversion Factor and picture of water meter). There are many good resources on the web that teach you how to read water meters such as (http://www.h2ouse.org/resources/meter/index.cfm). I suggest keeping a log of your meter, that way you see if your water company reads it the same way you do and you have an idea if your usage is going up or down. Read the meter every week and write it in your log. For commercial accounts this is a good way to demonstrate how your management of the client's water systems is saving them money. Again we can assume the number of toilet flushes, laundry loads and showers in the house or other applications in a commercial facility is fairly constant, what really should be changing is how much water is applied outside at any given time of year. The water meter is the ultimate gauge of water use on the property and is the best tool we have for monitoring our water saving efforts.

Tune up the irrigation system!

Probably the single most important water conserving practice you can do is to maximize the distribution uniformity of your irrigation system. This sounds major but its not. It is amazing but many people never see their irrigation system running because it is on a valve controller and it runs while they are away or asleep. The first thing to do is to manually turn on the system and see where the water is going. Commercial maintenance contractors should also undertake this procedure even if it is not within the duties of the job because irrigation greatly affects everything in the landscape. Seek permission to audit the irrigation system. It is a necessary part of good landscape management. If water is evenly applied where you want it, great! But most of the time this is not the case. There will be plugged emitters, emitters throwing water the wrong direction or onto hard surfaces, breaks in lines or even lost emitters with water geysers. Just becoming aware of what your water distribution system is doing is critical to saving water. Fix the obvious problems and you will save water. Further refinement of the irrigation system involves measurement of emitter output, pressures and distribution uniformity, which is not within the scope of this article but there are many on-line resources that can help get you started on that.

Pay attention to the time of the year!

The most important driving force in plant water use is sunlight. Sunlight (day length) varies following a bell shaped curve over the entire year. The most sunlight occurs in mid-summer and the least in mid-winter. These are the corresponding high and low water using times of the year. Water should be applied with durations that follow the amount of sunlight plants receive. Also, since we are in a climate when most rainfall comes in the winter, there is often little or no need to irrigation after the start of the first rains for many landscapes. An inch of rainfall that occurs in the fall or winter months may give three to four weeks of water supply to a typical landscape. I recommend that you turn off time clocks (sprinkler valve controllers) in the winter starting in November until the rainfall stops (whenever that is here; it is quite variable). If we get a sudden warming trend, wind event or other circumstance that dries the landscape, then irrigate manually to address that issue. You will save a lot of water since you are not automatically watering an already wet landscape.

Water when the plants tell you to!

Plants are the best indicator of drought stress (more on why that is in a subsequent article). The most obvious symptom that everyone recognizes is wilt. Physiological wilt occurs when there is not enough water in the plant and the soil to keep the plant turgid. If a plant stays in this condition for long, it may reach the permanent wilting point from which it can not recover. Before a plant goes into wilt, there are often other signs that it is in drought stress. Also, some plants like coast live oak, don't show "wilting" symptoms because their leaves are very sclerified or rigid and can't actually become flaccid. Before wilting, some plants lose their bright color. Instead of bright green they may look blue green or grey green, this dulling of color is the first sign of water stress. Some plants like bamboo and other grasses will roll their leaves as they dry out to slow water loss. Trees with flexible leaves may show a cupped shape when they begin to dry or may drop their leaves all together (shammel or mexican ash does this). Another indicator of drought stress is reduced growth. This may be ok if plant quality is acceptable because then there is less clipping, but if you notice that plants are not growing as much as you desire or they are not meeting your expectations for general appearance, you may not be watering enough and need to apply more. One of the problems with plants is that although they can tell you symptomatically when they are dry, plants are not very good about telling you when they are wet! Until diseases kill roots or stems, many plants will just grow in wet soils. Sometimes nutrients are not as available in wet soils so some deficiency symptoms may begin to show. Under wet conditions, micronutrients are reduced and become unavailable and macronutrients may leach so yellowing leaves may tell you that soils are too wet. Often however, diseases of root systems occur in wet soils and complicate the diagnosis. If diseases are present, and watering schedules are corrected, the drying soils may stress the diseased plants more and precipitate a rapid decline. Thus it seems that watering appropriately killed the plant. Diseases always complicate this situation.

Understand the "age" of your landscape and the implications on water use!

Newly planted landscapes use a certain amount of water, usually less than what is applied. Often landscapes are overwatered at first to make sure that root balls stay moist as they are trying to root into their new "native" soil. This establishment phase of irrigation should be very short, just a few weeks to a month—then the watering system is adjusted back to a schedule that reflects both plant needs and the demands of the climate and holding capacity of the soil. This is somewhat of an art. As the landscape grows, irrigation times, emitter placement, and emitter number all begin to (or should) change. More water may be needed in a growing and maturing landscape. The mature landscape water needs should remain constant for any given time of year from year to year (except when we have hot blowing wind—an anomaly of the weather). The watering schedule should increase and decrease to reflect the increase and decrease of solar radiation throughout the year. Know where you are in this scheme of things and then consider increasing or decreasing water applications appropriately. Also consider retrofitting your irrigation system to place water where it is needed (farther from tree trunks) and increase the number or type of emitters for larger plants.

Mulch bare soils!

For newly planted landscapes, mulch is an excellent mechanism for saving water. Numerous studies have shown that young plants that are mulched can skip every other irrigation (50% water savings) as compared to unmulched plants. Also, mulches inhibit the germination of annual weeds that will also use water that could be saved in the soil for the intended landscape plants. Be careful where you obtain mulch because urban yardwaste products are often contaminated with noxious weed propagules. Bark or wood chip mulches obtained from tree trimmers are the best mulches for landscapes. They last a long time and are usually not contaminated with noxious weeds. Remember that mulches may hold water, so each irrigation must apply enough water to saturate the mulch and wet the soil beneath to the desired depth.

Monitor soil moisture!

One of the most disastrous errors of landscape management is not understanding the water content of soils. There are many ways to know if your soil is wet or dry but few are as good as digging with a shovel and checking the "feel" of the moisture content in the soil. Many landscapes I have inspected were bogs of mud because they were so overwatered. In some cases water stands all the time in low lying areas. However, in mulched landscapes you may not know how much water is under the mulch. Visual evaluations are very misleading. Probing with a soil tube or even a screwdriver will tell you if the soil is dry. As soils dry they become "tight" and will resist penetration while wet soils are easily penetrated. Soil moisture meters can tell you if soils are wet or dry but are not accurate in the middle measurements. Expensive soil moisture monitoring systems such as tensiometers, capacitance meters and others are more accurate throughout the range of moistures in which plants grow but are also more expensive, may not be portable and will vary by soil texture and sometimes soil salinity. Digging the soil and feeling it with your hands is one of the best ways to assess soil moisture. It is completely empirical but rarely are you very wrong about your assessment.

Group plants that use more or less water

One of the most common problems I see is that plants are not grouped according to their water needs. Plants are flexible and will grow on the dry side or the wet side and so most landscapes achieve this odd blend of birches and agaves, but usually one partner or the other suffers. For optimum performance, low water using plants should be grouped together as should high water using plants. Be sure that turf areas are irrigated by their own irrigation valves. How do we know how much water plants actually use?? Good point. There is some information on this subject but because studies have been difficult to do for ornamental plants, there is no researched water use information for all the ornamentals we grow in California gardens. We have some data but very little compared to the thousands of ornamentals that are available for our gardens. The best suggestion I have is to group plants by their

Groupings of plants with different water needs makes management of the plant material difficult, increases the chances of biotic and abiotic diseases and may waste water.

climate of origin. Match the climate zones of the plants origin with the microclimates in your yard. There are many resources to find plant origins. Group plants that come from dry or Mediterranean areas together, as with stream loving (riparian) plants, or shade, tropical or other water loving plants can go together in their own special areas of the landscape. This makes irrigation much easier, more efficient, and the plants ultimately receive the proper amount of water necessary for their growth or maintenance. The biggest advantage is that you or your client will save money on their landscape water budget and the plants will grow and look better!