

Water Conservation in the Lawn, Landscape and Garden

Arvada Community Garden
Free Garden Class May 1 and 15, 2024

Class Outline

1. History of Water in Arvada
2. Current Water Conservation Efforts
3. Lawn Water Conservation Tips
4. Landscape Water Conservation Tips
5. Garden Water Conservation Tips
6. Resources
7. Questions

Pot Dripper Instructions

Usage method

$$\text{Days} \approx \frac{\text{ML}(\text{water}) \times s}{4320}$$

ML: Volume of water(ML)
S: Time of each drip(second)

For example
the vacation: 10days
you need: 1000ML water
Adjust speed of dripping water: 1drip/43s

$$9.95\text{says} = \frac{1000\text{ML} \times 43}{4320}$$

1 Put the regulating valve into the watering device 2 Cut a hole in the bottom of the bottle 3 Regulating drop speed 4 Potted plants

History of Water in Arvada

Arvada's history began in June of 1850 with the first recorded discovery of gold in Colorado by Lewis Ralston. The first irrigation ditch was dug in 1860 and a maze of irrigation ditches followed, many of which still exist today. The ditches alone could not provide enough reliable, quality water, and the first well was dug in 1870.

When the Town of Arvada was incorporated in 1904, it was an agricultural community known as the "Celery Capital of the World". The town had a population of 600. Water was either drawn from individual wells or from buckets filled in the irrigation ditches.

As Arvada's early pioneers settled into their daily routines, the demands for water grew along with the population. Farmers needed water to grow crops and miners required water for milling operations. The local blacksmith and the barber needed water for their daily operations as well.

A primary responsibility of any municipality is the provision of water. In 1910, the Arvada Water Tank was completed, providing artesian water that promised to end all water problems. However, it didn't take long for a growing population to stress the existing water system.

Throughout the years that followed, more wells were dug and dug deeper again. Pumps were installed and more water storage was added. By 1955 the population had grown to over 10,000. Residents were using 160 million gallons of water on an annual basis, and the well system was strained to the breaking point.

In 1956, a small water treatment plant was built which utilized water from the Clear Creek basin water rights the City had acquired.

In 1960, a contract was signed between Arvada and the Denver Water Board for 19,000 acre feet of water per year. The contract secures three-fourths of Arvada's current annual water needs. This water is collected from the Fraser River and South Boulder Creek Basins and transported first to Gross Reservoir and then to Ralston Reservoir. The water is treated in the City's Ralston Water Treatment Plant, which operates year-round.

The remaining one-fourth of the City's water supply comes from the City's Clear Creek basin water rights. These agricultural rights have been converted into municipal use. This water is stored in the Arvada Reservoir and treated in the Arvada water treatment plant facility, a peaking plant generally used in the summer months.

Water conservation is becoming an increasingly important staple in water management strategies across the Front Range.

Fortunately, the City of Arvada has been a longtime advocate of water conservation. The City adopted universal metering prior to 1950. In 1974 a billing structure was developed with increasing block rates according to customer usage. In 1979 a City code was adopted requiring that all plumbing fixtures be low-flow and all exterior hoses have automatic shut-off valves. In 1989, a comprehensive Water Conservation Master Plan was created and adopted. And most recently, the Arvada Water Supply and Demand Analysis was completed in 2015.

Definition of Terms

Acre-Foot (AF):	The amount of water it would take to cover one acre of land to a depth of one foot; 325,851 gallons.
GPM:	Gallons per minute.
Maximum Day:	The largest amount of water used in a single day.
MGD:	Million gallons per day.
MGH:	Million gallons per hour.
Potable Use:	Water that is treated to drinking water standards for municipal use.
Non-Potable Use:	Water that is not treated and is either used for irrigation or other non-potable uses.
Return Flows:	A portion of a water right that was historically used for irrigation that was not consumed by crops and made its way back to the river system as surface water and groundwater.

Water Sources and Delivery

The City of Arvada covers 39.51 square miles of land, has a current population of approximately 120,490 residents, and maintains 625 miles of distribution mains. The City operates two water treatment plants: Ralston Water Treatment Plant, with a capacity of 36 mgd, and Arvada Water Treatment Plant, with a capacity of 16 mgd. The City of Arvada has emergency interconnects with the City of Westminster and North Table Mountain Water and Sanitation District.

The City has two perpetual firm yield contracts with the Denver Water Board, representing up to 19,531 AF of raw water annually.¹ In addition, Arvada also owns various surface rights in the Clear Creek watershed with an average annual yield of 5,500 AF. Arvada is not currently utilizing its decreed non-tributary groundwater in its domestic water supply.

Arvada Reservoir is the City's main water storage facility with a capacity of 6,361 AF. Combining the two water treatment plants, Arvada has a total supply capacity of 52 mgd. Maximum water production capacity is 2.17 mgh. The City's water accounts are fully metered.

Current Water Conservation Efforts

The City of Arvada has a comprehensive water conservation program in place with current emphasis on increasing the level of customer participation. The City is required by contract to follow any emergency water restrictions imposed by the Denver Water Board. Current water-reduction guidelines in place pertain to the summer watering season, between May 1 and October 1, and state that customers should avoid watering between 10 am and 6 pm, not allow water to spray or pool on non-landscape areas, and avoid using spray irrigation during rain or strong winds.

City Efforts

- The City requires the installation of ultra low-volume (ULV) toilets for new construction or when remodeling includes changes to the existing plumbing system.

- Reduced tap fees are offered for water-conserving landscaping.
- An ongoing Xeriscape program at the Majestic View Nature Center, which includes demonstration gardens and public education, is available to the public year-round.
- Watering guidelines as well as water conservation tips are available on the City's website.
- Garden-in-a-Box kits and Water-Wise Landscape Seminars are offered seasonally to all City residents.
- 6% of the water system is inspected for leaks annually.

Public Education. The City of Arvada takes advantage of the many types of media available for relaying water conservation information to the citizens of Arvada.

- Water-saving tips are posted on the City's public website at arvada.org.
- The Arvada Report, which is a bi-monthly newsletter sent out to Arvada residents and businesses, periodically contains water conservation information such as watering guidelines, water-saving tips, and information on detecting sprinkler system leaks.
- The City's Nature Center staff educates both adults and children with their hands-on water demonstrations both at the Majestic View Nature Center and at local elementary schools.

City Facilities. The Majestic View Nature Center is a 3,000 square-foot public facility located in Arvada that features hands-on nature and environmental displays, Xeriscape gardens, wildlife exhibits, classrooms, and a children's area.

Lawn Water Conservation Tips

With today's common watering practices, up to 50 percent of the water applied to lawns is not absorbed by the lawn. It is lost through evaporation, runoff, or being pushed beyond the root zone because it is applied too quickly or in excess of the lawn's needs. The goal of efficient irrigation is to reduce these losses by applying only as much water as is needed to keep your lawn healthy.

To promote the strong root growth that supports a plant during drought, water deeply and water only when the lawn needs it. For clay soils, it is recommended to water less deeply, and in multiple cycles. Irrigating with consideration to soil type, the condition of your lawn, the season, and weather conditions— rather than on a fixed schedule— significantly improves your watering efficiency and results in healthier lawn.

Lawns can be irrigated manually or with an automatic irrigation system. Manual watering with a handheld hose tends to be the most water-efficient method. A study also showed that households with in-ground sprinkler systems used 35 percent more water; those with automatic timers used 47 percent more water; and those with drip irrigation systems used 16 percent more water than households without these types of systems. These results show that in-ground sprinkler and drip irrigation systems must be operated properly to be water-efficient.

YARDS WITHOUT AUTOMATIC IRRIGATION SYSTEMS

You can use a handheld hose or a sprinkler for manual irrigation. To reduce water losses from evaporation and wind, avoid sprinklers that produce a fine mist or spray high into the air. Soaker hoses can also be very efficient and effective when used properly. Also, consider using a handheld soil moisture probe to determine when irrigation is needed.

YARDS WITH AUTOMATIC IRRIGATION SYSTEMS

To make automatic irrigation systems more efficient, consider upgrading your standard clock timer to a WaterSense labeled irrigation controller. And rain sensors or soil moisture sensors will also help prevent waste by ensuring that the sprinkler does not turn on during and immediately after rainfall or when soil moisture levels are above preprogrammed levels.

With automatic systems, overwatering is most common during the fall when summer irrigation schedules have not been adjusted to the cooler temperatures. Irrigation system schedules should always be adjusted down in the fall to prevent overwatering in the colder months.

Lawn Watering Tips

1. **Wait to water lawns.** Don't turn on sprinklers too early in the season. Leaving lawns dormant longer will save water, and will not compromise the longevity of your lawn. April is too early to go automatic, plan on programming your sprinkler system to start in May or June.
2. **Water less frequently.** Watering twice a week will make grass roots grow deeper and allow the grass to last longer without water. Cycling sprinkler system run times can prevent excess water runoff, visual inspections after an initial watering cycle will make this apparent. Instead of setting each zone to water for 15 minutes, set each zone to water for five minutes, every hour, for a few hours and adjust accordingly. Colorado soils are less-absorptive than many other areas, excessive watering creates wasteful runoff.
3. **Water in the evening, night or early morning.** Watering lawns in the early morning or at night will help reduce water loss. During the daytime heat, less water will be available to plants due to loss from evaporation and wind.
4. **When it rains, water accordingly.** Watch the weather and adjust watering days and times accordingly. Use soil moisture sensors to automatically adjust watering schedules when it rains. As a less accurate option, use rain sensors to stop sprinklers when it rains.
5. **Let grass grow longer before cutting it.** Raise lawn mower blades and protect lawns from heat by letting grass grow longer (3-3.5"). A taller lawn provides shade to the roots and helps retain soil moisture, so your lawn requires less water.
6. **Water lawns - not roads and sidewalks.** Prior to installing a costly chase drain or other solution, request an irrigation audit. In our arid environment there should be no need to divert irrigation water.
7. **Fix leaks.** Check your sprinkler system monthly for broken sprinkler heads and damaged irrigation lines. Hire a professional to conduct a sprinkler assessment. A well maintained system will save both money and water.

8. **Plan ahead and plan efficiently.** If possible, delay new lawn installations for a non-drought year and avoid planting during the mid-summer heat.

Landscape Water Conservation Tips

GO NATIVE OR CHOOSE PLANTS THAT NEED LESS WATER

Your landscape design should take into account your local climate as well as soil conditions. Focus on preserving as many existing trees and shrubs as possible, because established plants usually require less water and maintenance. Choose plants native to your region. Native plants, once established, require very little to no additional water beyond normal rainfall. Also, because they are adapted to local soils and climatic conditions, native plants commonly do not require the addition of fertilizers and are more resistant to pests and disease.

When selecting plants, avoid those labeled “hard to establish,” “susceptible to disease,” or “needs frequent attention,” as these types of plants frequently require large amounts of supplemental water, fertilizers, and pesticides. Be careful when selecting non-indigenous or exotic species, as some of them can become invasive. An invasive plant might be a water guzzler and will surely choke out native species. Your state or county extension service or local nursery can help you select appropriate plants for your area.

PLAN BEFORE YOU PLANT

Developing a landscape plan is the first and most important step in creating a water-smart landscape. Your plan should take into account the regional and microclimatic conditions of the site, existing vegetation, topography, intended uses of the property, and most importantly, the grouping of plants by their water needs. Also consider the plants’ sun or shade requirements and preferred soil conditions. A well-thought-out landscape plan can serve as your roadmap in creating beautiful, water-smart landscapes and allow you to continually improve your landscape over time.

MAINTAIN HEALTHY SOILS

Because soils vary from site to site, test your soil before beginning your landscape improvements. Check with your local garden center for soil test kits and proper amendments. Alternatively, your county extension service can likely:

- Analyze the pH levels; nutrient levels (e.g., nitrogen, phosphorus, potassium); and the sand, silt, clay, and organic matter content of your soil.
- Suggest ways to improve your soil’s ability to support plants and retain water (e.g., by aeration or the addition of soil amendments).

WATER WISELY

Proper irrigation is an important part of using water efficiently outdoors, and applies in any landscape.

USE OF MULCHES

Mulches aid in greater retention of water by minimizing evaporation, reducing weed growth, moderating soil temperatures, and preventing erosion. Organic mulches also improve the condition of your soil as they decompose. Mulches are typically composed of wood bark chips, wood grindings, pine straws, nut shells, small gravel, and/or shredded landscape clippings. Avoid using rock mulches in sunny areas or around non-arid climate plants, as they radiate large amounts of heat and promote water loss that

can lead to scorching. Avoid using too much mulch, as excessive amounts can restrict water flow to plant roots.

APPROPRIATE MAINTENANCE

Water and fertilize plants only as needed. Too much water promotes weak growth and increases pruning and mowing requirements. Like any landscape, a water-smart yard can require regular pruning, weeding, pest control, and possibly irrigation.

As your landscape matures, it will require less maintenance and less water. Avoid shearing plants or giving them high-nitrogen fertilizers during dry periods because these practices encourage water-demanding new growth.

Garden Water Conservation Tips

Get rid of your sprinkler. Sure, there's nothing easier than setting out your rotating or oscillating sprinkler in the garden and letting it go. But much of the water you're using is evaporating before it can soak into the ground, some of it before it even hits the ground. A sprinkler wets down leaves and make them vulnerable to molds, blights, and fungus. Plants including beans and squash are particularly susceptible to this. Why endanger your plant's health *and* waste water at the same time. With sprinklers, there may be losses of water outside of the planting area, some runoff if application rates are too high, and evaporation loss to the air.

With furrow irrigation, there is generally some runoff, as well as low below the root zone. (Furrow irrigation efficiency can be greatly improved with level, basin-like furrows that confine the water that is applied.)

Drip irrigation systems allow water to be emitted uniformly and slowly at the plant location so that essentially all of the water is placed in the root zone. There are some possible problems with drip irrigation, too. The emitters or drip holes can become plugged with tiny particles or salts contained in the water supply. For this reason, most waters should be filtered. Cartridge-type filters are available and relatively inexpensive. The drip system can be used to provide nutrients to plants, but some planning is required. Soluble nitrogen and organic fertilizers can be applied through drippers, but phosphate fertilizers and many organic fertilizers cannot. Special application devices are available on the market through which nitrogen can be introduced to drip lines. But the simplest approach is to pre-fertilize the soil. For most vegetable crops, poultry manure will satisfy the nutritional requirements if applied in prudent amounts and tilled into the soil about three weeks before planting. Many types of drip irrigation devices are available on the market to fit the needs of different types of plantings. These vary from simple perforated tubes and leaky hoses to University of California Vegetable Research and Information Center sophisticated self-cleaning individual emitters. Inquire at local department stores, nurseries, and farm supply houses.

Soaker hoses work by allowing tiny amounts of water to seep through holes in the hose. It takes longer for the water to get to your plants but you can end up saving a lot more water by using them. Soaker hoses can be buried under the compost and near to where the plant's stem is and can even be attached to water butts instead of the tap.

Mulch. Not only does it keep down weeds and — depending on what you use — return organic materials to your soil, it slows water evaporation. Mulching, done right, is a win-

win-win. Make sure your mulch is weed-seed free so as not to spread trouble. But even if a few weeds do come up, they're usually easy to pull from mulch-covered soil.

Mulching helps to reduce evaporation and cool the soil (or warm the soil depending on the type of mulch used). Mulching can reduce the plants' water needs as much as 50%.

If you leave the soil around your plants bare, it will dry up and your plants' roots along with it. Keeping your soil moist and healthy during summer means that you need to protect its uppermost layer. Cover it with a mulch of your choice.

Mulches of plastic, paper or organic materials will greatly reduce evaporation losses from the soil surface, thereby conserving water for the plants. If the mulch is opaque, it also will control weeds, which rob your soil of moisture.

One choice is black polyethylene plastic, of four-mil thickness. Apply it over as much of the soil surface as possible. Perforate with one- or two-inch diameter holes for placing seeds or transplants. With some care and ingenuity, plastic can also be placed over the soil around existing plants. Hold it in place by burying the edges, placing a few rocks on top, or punching wire wickets through the plastic and into the soil.

Clear plastic will increase soil temperature more than black plastic, but weeds will grow beneath it.

Various types of paper will also prevent moisture loss from the soil surface. Heavy craft wrapping paper, insulating paper, and even newspaper can be used; they will deteriorate or break down more readily than plastic film.

Organic mulches, which include shavings, compost, rice hulls, bark, straw, and similar materials reduce moisture loss. They should be placed in a layer that's two or three inches thick to be the most effective. In addition to their value for moisture conservation, they can be tilled into the soil after cropping to improve the organic content. They will also be helpful in controlling weeds, if they are in a thick-enough layer. Organic mulches are not as efficient as plastic for moisture conservation, but they will be more attractive and perhaps more readily available.

Avoid fine mulches that tend to clump and become water-repellent. Instead, use a coarser mulch which allows water/rain to move down through to the soil.

Add lots of compost to your soil. The more organic matter in your soil, the more it will retain moisture. Soil quality, as we've said over and over, is the key to growing.

Adding compost to the soil will help reduce the plants' need for water. Studies have found that increasing the amount of organic matter by only 5% will quadruple the water holding capacity of the soil. Compost can be worked into the soil from compost piles or bagged compost. Or you can increase organic matter by putting in a fall cover crop that will grow over the fall and winter. Cut the crop when it starts to bloom (or before) and allow it to sit and decompose, now you have green manure to add to the soil. The green manure will not only add organic matter to the soil but the legumes in the mix will fix nitrogen and increase the fertility, a win, win way to go.

Well-amended soil is the foundation of a vegetable garden that will tolerate drought. Prepare your garden's soil by adding lots of rich, organic compost that will help trap moisture and encourage deep root formation in plants. Biochar aids soil fertility, but this highly porous charcoal also helps the soil retain water.

All of this soil amending is for naught if you aren't mulching to reduce evaporation and water runoff. A thick carpet of mulch will also keep down the weeds that compete with your vegetables for water and nutrients.

Clay soils with added organic matter will accept water more quickly. Organically amended sandy soils hold water longer, and don't need to be watered as frequently.

Water only when your plants need it. If your garden is large, this could be at different times in different parts of your plot. How do you know when it's time to water? Stick your finger in the dirt. It should be dry down to the first knuckle and beyond and only moist much further than that. Then water thoroughly. It's common knowledge that less-frequent, deep watering, down to six inches or so, are better than frequent light drinks which don't encourage plants to root deeply. The deeper the roots the longer between watering for your plants. Water at the beginning of the day before the peak evaporation hours. You can also water at the end of the day but that doesn't often allow enough time for it to evaporate off leaves where mildew and other problems might start.

Water needs will vary depending on the stage of development of your plants. Moisture levels are critical when plants are young and have not developed a mature root system, right after transplanting and during flowering and fruiting.

If your vegetables are planted before the hot and dry days of summer arrive, they'll have time to establish a root system that will allow them to survive the hotter days. Deep watering will train roots to grow deep into the ground. A drip irrigation system will deploy water where it is needed and potentially reduce your water consumption by as much as 50%. Soil amended as described above should be able to go between two and seven days between irrigation.

Knowing at what stage of development your vegetables will need water can also help you reduce the amount of water you use. Vining crops like cucumbers, assorted melons, summer and winter squash are frequently over-watered by gardeners. They require less water than many other vegetables, and watering is only critical during flowering and fruiting. The same goes for eggplant, peppers, and tomatoes.

The time of day that you water makes a huge difference in how much moisture gets to your plants. Watering in the heat of the day can mean quite a lot of it will evaporate from the soil long before it reaches any roots. The best time to water the garden is early evening. Not only will it be cooler to work outdoors but less evaporation will happen. Give the moisture a full night to seep further down and you'll end up saving a lot of water in the long run. If you can't get to the garden in the evening, water it early in the morning. The earlier the better to help the soil soak up moisture before the sun starts beating down.

Proper timing and amount of irrigation will make the best use of available water. Irrigating "just to make sure" is wasteful. Letting the soil get too dry between irrigations is a waste of water, too, because it affects the ultimate yield and quality of the crop. Before deciding to irrigate, examine the soil at a depth of four to 12 inches. Squeeze it in your hand; if it holds together without crumbling, moisture is probably adequate. Watch for slight wilting on hot afternoons. As the soil dries, the foliage will darken and take on a dull appearance.

Where drip irrigation is to be used, the system should be operated frequently to maintain soil moisture and to prevent plugging of the small emission holes. As a general rule, turn the system on for about an hour every two to three days. Greater frequency for shorter periods daily will be required during hot weather for shallow-rooted crops.

When using a watering can or hose, direct the water at the bases of the plants only. A gentle shower of water on the compost will make it straight down to where it's needed without being wasted on the foliage.

You might think that using a sprinkler can waste a lot of water. In fact, a good soaking with a sprinkler every week can be more efficient than trying to water your plants every day. Efficient in saving your time and also efficient at saving water over the course of the week.

Water Pots in the Afternoon and your Garden in the Morning. Research shows that the timing of *when* you water pot plants during the day can have a significant effect on plant growth. The potted plants used in the research were grown in pine bark based potting mix. Pine bark based potting mixes however, have low moisture retention properties, meaning pot plants dry out more quickly.

The research found that plants watered after 12:00 pm and during the afternoon, “significantly outperformed plants grown with early morning irrigation.” So, watering *container plants* in the afternoon may lead to healthier, stronger growing plants compared to container plants watered early in the morning.

The optimal watering time for the rest of the garden, is early morning before the temperatures begin to rise, winds are lower and there is less evaporation. Morning watering gives the plants a good supply of water to face the heat of the day.

Recycle water. Ordinary washing up liquid, shampoo, and soap are harmless to plants. That means that you could save your dishwater and bath water for use in the garden. Using a plastic tub to do your dishwashing it makes taking it out to the garden very easy. In the case of greywater **from** the sink, tub, or washing machine you may have to either bail it out or install custom plumbing.

Ollas are a simple and ancient way of watering crops in arid climates. Terracotta wicks water from inside out, which is why pots can get moist after you water them. A terracotta vessel sunk in the ground will slowly release water to the plants around them.

Harvest Water – Ways to Save and Reuse Water

- Install a water tank rather than wasting rainwater, to maximize roof runoff and redirect it for use on your garden. Slimline tank and water harvesting systems are available for even the tiniest of spaces.
- Save your Cooking Water. If you steam or boil vegetables, save the water rather than tipping it down the sink! It is full of nutrients and when cooled, makes a free fertilizer for watering your plants.
- Reuse Fish Tank Water. When you clean your fish tank, use the ‘old’ nitrogen and phosphorous-rich water on your plants.
- Collect Shower Water. Put a couple of buckets in the bottom of your shower, while the water is heating up. Save these to water your garden every day.

Rainwater Harvesting. Saving water from storms with rain barrels or cisterns is a great way to further reduce your water consumption. Homes with access to alternative sources of irrigation can reduce their water bills and the runoff that would otherwise go into the street. Commercial rooftop collection systems are available, but simply diverting your downspout into a covered barrel is an easy, low-cost approach. When collecting rainwater, cover all collection vessels to prevent animals and children from entering and to prevent mosquito breeding. Some states might have laws which do not allow collection of rainwater, so be sure to check with your state’s water resource agency before implementing a rainwater collection system. Check with your local water utility or county government to see if there are rebate programs available in your area.

Plant vegetables that use a lot of water close to each other. Yes, with all the other rotation and companion planting considerations you make when designing your garden, this may not be easy. But planting, say tomatoes nearby melons or corn, your water will be doing double duty. After that lettuce goes your tomato plants will be well established plants.

Consider not putting in plants that are heavy water users like corn or beans... or just plant less (although hard to do with corn). If you can't do without in the garden, make sure to mulch heavily.

Plant in blocks as opposed to rows. Leaves shade the soil and you get less evaporation.

Plant your vegetable garden in block style layout rather than in rows to create microclimates, shade and reduce water evaporation.

Layout your vegetable garden so that plants with similar water requirements are grouped together. For example, cucumbers, zucchini, and squash all have similar water needs. Focus on vegetables that produce abundant crops like tomatoes, squash, peppers and eggplants.

Edit the number of plants you grow to conserve water and space. One or two determinate tomato plants can serve your needs. Unless you can't live without them, avoid growing space and water hogs like broccoli and cauliflower.

Choosing Vegetables for Drought Tolerance Seek out plants and varieties that do well in hot and arid locations. You can purchase seeds for agricultural crop varieties that are arid-land adapted.

Beans have the highest water requirement of all of the common garden vegetables. And cole crops and root crops need a consistently moist soil during their life span. But you can still grow your favorite vegetables even if they aren't exactly adapted to growing in a dry garden.

Varieties with short days to maturity are a viable option if you are conserving water in the garden. As are miniature varieties like the mini bell peppers and eggplants grow because they need less water for fruit development than their larger counterparts.

Crop selection is important where water is expected to be in short supply. Plants with shallow root systems will require more frequent irrigation to maintain a healthy growth rate. *Shallow rooted* plants include potatoes, onions, most other bulb/root/tuber crops, celery, and cabbage family plants. *Deep-rooted* crops include tomatoes, corn, winter squash, sweet potatoes, melons, and asparagus. Beans, carrots, peppers, summer squash, and cucumbers are *intermediate* in root depth. Mulching, with either plastic or organic materials, will be more beneficial for the shallow rooted crops by reducing surface evaporation. Also, be certain to plant crops at the time of year when they are best adapted, by growing cool-season crops during the cooler months and warm season crops during spring through summer.

Make a Water-wise Pot Choice if Container Gardening Choose your plant container carefully. Different materials heat up quickly or lose moisture due to porosity so think about your pot location *before* making a final decision. For example, metal heats up quickly so raised galvanized garden beds and metal containers will draw moisture out of the soil and these gardens will need more watering. If you live in a hot climate, this may be a major consideration.

Clay pots such as unglazed terracotta will lose moisture through their porous surface and the soil will dry out faster than glazed pots. It's vital to use a quality potting mix that holds moisture.

Weed control is essential to reduce competition between crops and weeds for soil moisture. It is best and easiest to remove weeds while the weeds are small. Keep the hoe sharp, and make shallow cuts to avoid bringing deeper weed seeds to the surface. Pull weeds that are close to the garden plants.

The Three Sisters Garden Explained. Planting Techniques like the Three Sisters (beans, corn and squash) Garden is a companion planting method that the Native Americans have used for ages that you can employ in your own garden.

In the Three Sisters Garden mound, beans fix nitrogen into the soil, corn provides support for the beans to grow up, and the bristles on the squash stem protect the corn from the corn earworm while shading the soil all three plants grow in.

Use a Moisture Meter. This inexpensive tool will help you get a feel for what each of your plants need in terms of moisture. It is easy to use and provides you with an accurate reading of the moisture content in your soil in a few seconds. 10-30% moisture indicates the soil is too DRY and you *need* to water; 40-70% moisture means the soil is MOIST or 'just right' so *no action is required*; and a reading of 80-100% moisture means your soil is too WET so *avoid watering*.

Alternatively, use a screwdriver or chopstick as a soil probe to test soil moisture. If it goes in easily, don't water; if it won't budge then grab a watering can! A watering can is also a good way to make sure you only water as much as you need to.

Resources for learning about low water landscaping

- **City of Arvada** has a number of Water Savings Programs and partners with Resource Central. <https://www.arvadaco.gov/602/Water-Saving-Programs>
- **Resource Central:** Resource Central has four programs to save money, conserve water and beautify landscapes: Garden in a Box, Waterwise Yard Seminars, Lawn Replacement and Slow the Flow. Resource Central is a great source for tips and inspiration as you go low water outside. <https://resourcecentral.org/>
- **Plant Select:** Plant Select® is the country's leading brand of plants designed to thrive in high plains and intermountain regions, offering plants that provide more beauty with less work. Their website contains education and design resources as well as places to purchase Plant Select plants. <https://plantselect.org/>
- **Colorado State University Extension:** CSU Extension provides many online resources to support residents in creating healthy, sustainable lawns and gardens. <https://extension.colostate.edu/topic-areas/yard-garden/>
- **Demonstration gardens:** There are many demonstration gardens in the region that can inspire you to make changes to your home landscape. Majestic View Nature Center is in Arvada. There is a Plant Select demonstration garden at the Jefferson County Fairgrounds. Other locations such as Denver Botanic Gardens, Chatfield Gardens and Hudson Gardens have areas dedicated to showcasing native, low water plants. Also check out the gardens at the Arvada Community Garden.

- **City of Arvada Plant List:** The following plants are recommended within the city. For new development, other plants species may be proposed as long as they have a proven track record of not being invasive within the Front Range. Xeric species preferred. <https://www.arvadaco.gov/181/Plant-List>
- The **WaterSense** website can link you to a number of additional resources, including information on how to choose the right plants for your landscape. <https://www.epa.gov/watersense>
- The City of Arvada also provides **Tips for Reducing Outdoor Water Usage**. <https://www.arvadaco.gov/597/Watering-Tips>
- The City of Arvada's **Water Conservation Plan** also provide additional info. <https://library.municode.com/co/arvada/munidocs/munidocs?nodeId=68cba862af174>
- Woven weed barrier that can be used over and over again in the garden is available from **Greenhouse Megastore**. Just dry it and the roll it up at the end of the season. Some weed barriers have markings every foot to help with planting. <https://www.greenhousemegastore.com/collections/landscape-fabric>

Questions?