



Water Conservation

Save water with efficient systems and healthy plants.



In Your Backyard

Wise use of water for garden and lawn waterings not only helps protect the environment, but saves money and provides for optimum growing conditions. Simple ways of reducing the amount of water used for irrigation include growing xeriphytic species (plants that are adapted to dry conditions), mulching, adding water retaining organic matter to the soil, and installing windbreaks and fences to slow winds and reduce evapotranspiration.

Watering in the early morning before the sun is intense helps reduce the water lost from evaporation. Installing rain gutters and collecting water from downspouts also helps reduce water use.

Plant Needs for Water

Water is a critical component of photosynthesis, the process by which plants manufacture their own food from carbon dioxide and water in the presence of light. Water is one of the many factors that can limit plant growth. Other important factors include nutrients, temperature, and amount and duration light.

Plants take in carbon dioxide through their stomata--microscopic openings on the undersides of leaves. Water is also lost through the stomata in the process called transpiration. Transpiration, along with evaporation from the soil surface, accounts for the moisture lost from the soil.

When there is a lack of water in the plant tissue, the stomata close to try to limit water loss. Wilting occurs when the tissues lose too much water. Plants adapted to dry conditions have developed numerous mechanisms for reducing water loss, including narrow leaves, hairy leaves, and thick fleshy stems and leaves. Pines, hemlocks, and junipers are also well adapted to survive extended periods of dry conditions which they encounter each winter when the frozen soil prevents the uptake of water. Cacti, with leaves reduced to spines and having thick stems, are the best example of plants well adapted to extremely dry environments.

Choosing Plants for Low Water Use*

You are not limited to cacti, succulents, or narrow leafed evergreens when selecting plants adapted to low moisture requirements. Many plants growing in humid environments are well adapted to low levels of soil moisture. Numerous plants found growing in coastal or mountainous regions have developed mechanisms for dealing with extremely sandy, excessively well-drained soils, or rocky cold soils in which moisture is limited to months at a time. Following is a list of low water use plants from various parts of the country:

North West

- Saskatoon serviceberry (*Amelanchier alnifolia*)
- Blue grama (*Bouteloua gracilis*)
- Rocky Mountain Juniper (*Juniperus scopulorum*)
- Oregon white oak (*Quercus garryana*)

South West

- Four-wing saltbush (*Atriplex canescens*)
- Fairy Duster (*Calliandra eriophylla*)
- Penstemon (*Penstemon* spp.)
- Pinyon pine (*Pinus edulis*)

North Central

- Aromatic aster (*Aster oblongifolius*)
- Sideoats grama (*Bouteloua curtipendula*)
- Bluegrama (*Bouteloua gracilis*)
- Pale purple coneflower (*Echinacea pallida*)
- Compass plant (*Silphium laciniatum*)

South Central

- Aromatic aster (*Aster oblongifolius*)
- Sideoats grama (*Bouteloua curtipendula*)
- Bluegrama (*Bouteloua gracilis*)
- Tall blazing star (*Liatris aspera*)
- Bur oak (*Quercus macrocarpus*)
- Aromatic sumac (*Rhus aromatica*)

North East

- Big bluestem (*Andropogon gerardii*)
- Eastern red cedar (*Juniperus virginiana*)
- Blazing star (*Liatris spicata*)
- Pitch pine (*Pinus rigida*)
- Beach plum (*Prunus serotina*)

South East

- Tall blazing star (*Liatris aspera*)
- Longleaf pine (*Pinus palustris*)
- Sand Live oak (*Quercus germinata*)
- Little bluestem (*Schizachyrium scoparium*)
- Compass plant (*Silphium laciniatum*)

*Always check with your local State extension service when selecting plants to avoid the potential of selecting a plant that is considered invasive in your particular location.

Efficient Watering Methods

Trickle irrigation and drip irrigation systems help reduce water use and meet the needs of plants. With these methods, very small amounts of water are supplied to the base of the plants. Since the water is applied directly to the soil, rather than onto the plant, evaporation from leaf surfaces is reduced. The water is also placed where it will do the most good, rather than sprayed over the entire garden.

Installing Irrigation Systems

An irrigation system can be easy to install. Numerous products are readily available for home use. The simplest system

consists of a soaker hose that is laid out around the plants and connected to an outdoor spigot. No installation is required and the hose can be moved as needed to water the entire garden. A slightly more sophisticated system is a slotted pipe system.

Slotted pipe system installation

1. Sketch the layout you will need. If you intend to water a vegetable garden, you may want one pipe next to every row or one pipe between every two rows.
 2. Depending on your layout, purchase the required lengths of pipe. You will need a length of solid pipe the width of your garden. You will need lengths of perforated pipe the length of your rows (the laterals) times the number of rows.
 3. Measure the distances between laterals and cut the solid pipe to the proper lengths.
 4. Place t-connectors between the pieces of solid pipe.
 5. Approximately in the center of the solid pipe, place a t-connector to which a hose connector will be fitted.
 6. Cut perforated pipe to the length of the rows.
 7. Attach perforated pipe to the t-connectors. Attach so that the perforations are facing downward. Cap the end of the pipe.
 8. Connect garden hose to hose connector on solid pipe. Adjust water from the spigot until water slowly emerges from each of the laterals.
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Drip or Trickle Irrigation

The basic elements of a drip or trickle system consist of the head, the tubing, and the emitters.

The head is the part of the system that connects to your water supply. The major components of this may include a pressure regulator, a filter, an anti-siphon valve, and an automatic timer. While this may sound complicated and expensive, it is not. Installation of these components will create a better operating system.

Consideration for the Head

1. Many drip systems are designed to be used with low water pressure, under 25 pounds per square inch (psi). Normal city water pressure is about 55 psi. Therefore, a pressure regulator should be installed.
2. Because of the small size of the openings in the emitters, they easily can become clogged by sediment in the water. A filter should be installed to keep openers operating freely.
3. Consider installing a back flow preventer. This is a valve that prevents the accidental backflow of water in the system getting into the water line. This may be required by city ordinance in some municipalities. Considering the minor cost, it is probably a wise investment for anyone considering a system.
4. A timing device can be added to automatically turn the system on and off. This can be as simple as a battery operated attachment or a more permanent timer that is wired into your electrical system.

Plastic tubing is used to get the water from the source to the garden. This comes in many sizes. A variety of fittings are available to go around corners and to connect pieces.

Plastic Tubing Considerations

1. Check with the supplier for the maximum length of tubing that can be run in any one direction. A general recommendation is that 400 feet is the maximum for 1/2 inch tubing.

2. Consider what you intend to water with the drip system. You may need several different systems to best meet the needs of various plants. Not all plants have the same water requirements, and soil conditions in various parts of your yard may vary. Trees, because of their large size and deep root systems, probably will require less frequent but longer waterings. Well mulched vegetable gardens high in organic matter or shady flower gardens probably will require shorter watering times than gardens with sandy soils or those in full sun.

Emitters deliver the small amounts of water to the plants. Depending on the design, emitters can either be attached directly to the pipe or attached to "spaghetti tube," a very small flexible tube that can be placed next to plants or in pots. Emitters can let water drip out very slowly, or small sprinkler emitters can be installed to provide a spray pattern similar to a lawn sprinkler. Sprinkler emitters may be appropriate for watering groundcover and lawns.

The size of the emitter will influence the amount of water delivered. Drippers vary in the amount of water delivered per hour. Some deliver as little as one half gallon of water per hour while others deliver up to 10 gallons per hour. Some emitters are adjustable to deliver different rates of water. Sprinkler emitters also are available in various flow rates as well as with different spray patterns and coverage areas.

While these systems need more planning, they are neither expensive or difficult to install. In most cases, no special tools or skills are needed. Plastic pipe is punched with an inexpensive tube punch that assures the proper hole size. Emitters or spaghetti tubes snap into the hole. No gluing or soldering is required. Because the holes are small, they can easily be plugged if you put one in the wrong place. Some systems come with pre-assembled emitters at regular intervals. Drip systems require periodic maintenance. You will also need to check emitters to make sure they are working properly as they can become clogged.

Once you have thought about your watering needs, discuss your ideas with a supplier. Most trickle irrigation suppliers will help you design a system to best meet your gardening needs.

On the Farm

Trickle irrigation systems are frequently used by farmers dealing in high value crops such as vegetables, and small fruits such as grapes and berries, where lack of moisture can mean the difference between a profitable harvest or costly failure. These systems are similar to those used by the home gardener.

High-efficiency irrigation systems for row crops use less energy to pump water and, since they spray water downward, less water evaporates before it reaches the crop.

Farmers implement other water management practices to reduce the amount of water used to produce a crop.

More About Backyard Conservation

The Natural Resources Conservation Service, National Association of Conservation Districts, and Wildlife Habitat Council encourage you to sign up in the "Backyard Conservation" program. To participate, use some of the conservation practices in your backyard that are showcased in this series of tip sheets -- tree planting, wildlife habitat, backyard pond, backyard wetland, composting, mulching, nutrient management, terracing, water conservation, and pest management. Then, simply fill in the Backyard Conservation customer response card, send a Backyard e-mail request to landcare@usda.gov, or call 1-888-LANDCARE.