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EXTENSION

Cultural Practices for Water Conservation: Landscape Plantings

Part 5 of 5 in the series "Water Conservation in Connecticut Landscapes"

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Changing weather patterns and increasingly dry conditions have made water conservation in Connecticut landscapes a priority. Landscape professionals and home gardeners can adopt simple and smart water conservation strategies to be part of the solution. **Proper cultural practices are a critical component of efficiently using water in the landscape, reducing waste, and maximizing the health of landscape plants.**

I. USE PROPER LANDSCAPING MANAGEMENT TECHNIQUES

Proper care of landscape plants is essential to their health.

- Properly prune or trim trees, shrubs and other woody plants to maximize the plants' health and minimize invasion by pests. Frequently remove dead or dying plants. Maintain sharp blades on pruners, shears, and loppers.
- Apply fertilizers or pesticides, if required, following label recommendations and timed to the plants' specific needs.
- Remove all weeds, which will compete with desired plants for water, nutrients, light, and space.

Eliminate or minimize the potential for water runoff.

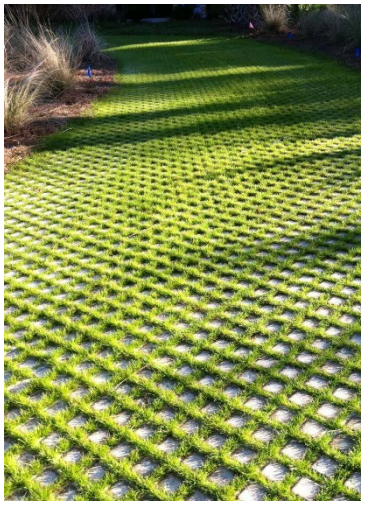
- All water should infiltrate in the soil where it can be used by plant roots or recharge groundwater.
- Keep topsoil covered with mulch or densely spaced plants. The impact of rain from intense rainstorms or unchecked irrigation systems on bare soil results in soil erosion that is lost in runoff.
- Use porous materials for walkways and patios that allows water to slowly infiltrate into the soil, remain in place, and prevent wasteful runoff.
- Divert runoff from roofs, sidewalks, and driveways into rain gardens or yard areas where it can recharge groundwater rather than become lost as run off.

Reduce soil compaction, which limits growth of the plant's root system, overall health, and available water for uptake.

- Periodically aerate planting beds to decrease compaction and improve infiltration of water, air and nutrients into root zones. The soil around existing plants may be cultivated (loosened and broken up) by hand, with a hoe, or with a cultivation machine for larger areas. Soil cultivation should be considered in landscapes where large trees dominate the landscape beds and have encroached into nearby lawns.

Place mulch around plants, especially new plants, to help reduce water loss through evaporation.

- Mulches should permit water to soak into the soil. Bare soil is exposed to desiccating winds and baking sun that dry the soil quickly and waste a lot of water that could otherwise be protected by mulch. A 2-4" layer of mulch keeps the soil moist, decreases evaporation, reduces weed growth, and slows erosion.
- **Common organic materials used for mulch** include straw, salt marsh hay, composted wood chips, and chopped up leaves. As organic mulches decompose, they help replenish nutrients in the soil. They must be reapplied regularly as they break down.
- Be aware that some upper layers of mulch may dry out to the point that they repel water, rather than retain it. Wetting agents may be sprayed on mulches to improve water flow through the mulch layer.
- Inorganic materials, such as gravel, stone, or pebbles, also can be used. They can be desirable in shady areas that require little maintenance. Inorganic mulches should be avoided near houses and full sun areas, as they absorb sunlight and contribute too much reflected heat.



Ground covered with drought-tolerant plants provides an attractive, low maintenance solution to conserve water (top). A sustainable driveway designed with permeable pavers (bottom).

Use no-till maintenance practices in garden beds.

- Maintains crop residue at the soil surface, keeping root systems intact, and achieving improved infiltration.

Use cover crops in vegetable gardens off-season.

- Contributes mulch cover; prevents soil erosion; replenishes organic matter; improves infiltration when harvested.

II. IMPROVE AND PROTECT SOIL STRUCTURE

Soil is an excellent filtration system. **A well-structured soil reduces the need for frequent irrigation.** Soil in landscape beds and in turfgrass areas should be able to absorb and retain water from irrigation or rain events. Plant roots need air and space to spread roots without resistance, and to penetrate deeply to access water reserves held low in the soil profile.

A well-structured soil allows for easy rooting and water and air movement through the soil. Image courtesy of www.omafra.gov.on.ca

- Soil structure defines how individual soil particles aggregate (bind together). **How soil particles aggregate and bind together affects water movement into and through the soil.** Living components of the soil, including microorganisms and worms, develop by-products that "glue" these aggregates together. Their movement through the soil helps make it more porous.
- Healthy topsoil is composed of a mix of different sized aggregates. It should have a grainy, crumbly consistency and contain space for water passage and storage. Finer-textured soil holds more water than coarse soils, requiring less frequent irrigation.

Organic material in the soil will decompose into "humus." Humus is a valuable component of the soil that helps loosen soil for better water infiltration and stores water within the soil. For every 1% of organic matter content, each cubic-foot of soil can hold an additional 1.5 quarts of plant-available water.[1] 5% organic matter in the soil is recommended for woody and herbaceous landscape plantings. **Organic matter must be regularly added to the soil, since it is continually breaking down.** Complete a soil test every 2 to 3 years to keep track of changes in the percentage of organic matter and soil nutrient levels. Applications for soil tests and protocol for sampling can be obtained through UConn Extension. For instructions, visit http://www.soiltest.uconn.edu/sampling.php or call the UConn Soil testing lab at (860) 486-4274 or the UConn Home and Garden Education Center toll-free at (877) 486-6271. To determine the percent organic matter in a new or established site, take a soil test that includes an organic matter evaluation.

Improvement in soil structure is more easily accomplished prior to new landscape construction, before plants are selected and placed. In established landscapes, soil structure improvements can be made, but with greater challenges. **Incorporate organic matter** (such as dry, well-aged compost) into topsoil of new landscaping beds to improve bulk density. Developing organic matter content can improve water retention in sandy soils, and improve porosity in clay soils. In open areas of established landscapes, compost can be spread on the surface of beds. **Any compost added to the soil should be based on soil test results** and included as a component in an overall nutrient management program for the landscape area.

Control erosion:

- Maintain healthy and dense turfgrass stands and groundcover plantings.
- Use mulch around plantings to help keep soil in desired location.
- Regular addition of organic matter to the soil results in larger soil particles, less likely to be blown or washed away.

Reduce compaction:

For new sites/landscapes:

- If soil is compacted, till soil to a depth immediately below the compaction layer to improve water penetration.
- Limit soil compaction and disturbance by designating paths for machine and foot traffic.

For established sites/landscapes:

- Limit traffic in garden beds. Designate permanent areas or pathways for foot and other traffic (e.g., wheelbarrows).
- Aerate established landscape beds when needed to promote deeper root growth, improve water infiltration rates, and enhance nutrient movement in the soil.

[1] http://ag.umass.edu/fact-sheets/managing-soil-structure-for-water-conservation-in-landscape

III. GROW DROUGHT RESISTANT PLANTS

When selecting plants for the landscape, choose plants that, once established, will persist with reduced amounts of water and limit the need and duration of supplemental irrigation. Drought tolerant plants tend to have deep roots that pull moisture from far below the soil surface, waxy leaves or fine hairs that trap moisture at the leaf surface, or a reduced leaf surface area or number of needles to help minimize water loss.

Many established plants need little to no supplemental irrigation, especially if they are drought tolerant.

Important considerations when using drought-tolerant plants include:

- **Right plant, right place.** Match the plants with the existing and correct growing conditions, to reduce labor and costly human inputs, such as irrigation and soil amendments. **Each plant should be paired with their preferred native soil type (i.e., clay, sand, silt) and sun exposure (i.e., sunny vs. shady).** For example, some shade-loving plants are drought tolerant in the shade but need supplemental water to survive in the sun.
- **Group plants with similar watering, sun, pH, and fertilizer requirements together** for optimal growing conditions and to allow for the most efficient use of resources. Place plants with higher water needs together in a site close to a water source.
- **Understand the soil and growing condition variations on the site (microclimates).** Factors that influence the rate of plant dehydration include soil type (sandy soil dries out quickly, while clay soils holds moisture longer), topography (hills vs. valleys) and exposure to wind and sunlight (sun vs. shade). Different areas of a single property may vary greatly in these characteristics and should be planted accordingly. These various microclimate factors will have a significant impact on the timing and amount of irrigation that is needed.
- **Even drought tolerant plants need care during establishment.** During the first growing season, a plant's root system is small and can draw water from only a limited area. Young plants require supplemental irrigation until the root system becomes established, usually by the second growing season, depending on the plant.

IV. WATER PROPERLY FOR OPTIMAL PLANT HEALTH AND MAXIMUM IRRIGATION EFFICIENCY

In home landscapes, water all plants deeply but infrequently to encourage deeper, healthier rooting. **Design and select plants in the landscape according to plant water needs.** Place plants with higher water needs together.

If plant or soil water content becomes limited, drought stress or (eventually) plant death may occur. Water is lost from the plant root zone by gravity, evaporation, and plant uptake. **Water plants when both the soil and the plant conditions merit the need, rather than irrigating on a schedule.** This practice helps to avoid overwatering, conserves water, and protects plants from extended drought stress. Drought stress symptoms include leaf wilt (leaf folding and rolling) and leaf firing (yellowing, tan/brown leaves).

This hydrangea, while moderately drought tolerant, is wilting from lack of water (left). Once irrigation or rainwater is made available, the leaves once again become turgid, or stiff (right).

More deeply-rooted and established plants can extract water from a greater volume of soil, making them more drought tolerant than shallow-rooted species or juvenile plants. When compared to coarse (e.g., sandy) soils, finer-textured (e.g., loam, clay) soils hold more water and require less frequent irrigation.

Established landscape plants (trees, shrubs, and perennials):

- **Established plantings may not need any supplemental water, if plants selected are at least moderately drought tolerant.** However, in very dry and hot summers, some watering may be necessary.
- Saturate the root zone at the base of the plant. Low water pressure allows irrigation to trickle into the soil slowly for optimal absorption, instead of running off of the surface. Watering is needed less frequently when the soil around each plant is saturated at each watering.
- In July and August, watering of established plants may need to be done once every two weeks, or less depending on weather. Water established trees so that water percolates to a depth of 10-14 inches.[2] Plants are usually considered established after 1-3 years, depending on the species and type of plant.
- Wetting the leaves and stems does not help, as water is only absorbed through the roots in the soil.
- Drip irrigation systems, rather than sprinkler systems, are recommended for landscape plantings. Install soil moisture sensors on all irrigation systems to help determine water needs in landscape plantings.

New plantings:

- The best time to plant trees, shrubs, and perennials is in the early fall, when rainfall supports establishment, requiring less frequent supplemental irrigation. Planting in early fall allows plants adequate time to develop roots before the onset of winter and avoids the stress of summer heat in the early months of establishment. Plantings in spring may be challenged to grow in areas where water is limited.
- Water is critical for new plants during establishment. Plants with a juvenile root system (generally, plants under 1-2 years of age) will need more water than established plants.
- Use the same technique as with established plants to saturate the soil around the root zone. During the first month of a new planting, watering may need to be done twice a week. Watering may need to be done once a week, depending on plant species and weather, for the first year.
- Build a ring around each plant, of soil, gravel, or rocks, so that water applied near the root zone is contained and has the opportunity to stay in place and be absorbed into the soil. This is especially important if the plants are located on a slope.

New plantings require supplemental waterings, even if they will be drought tolerant once established.

Annual flower and vegetable plantings:

- Water in the same way as for established plantings, saturating the soil around the plants. For young plantings, watering may be required once or twice a week during drought conditions, depending on plant type and weather conditions. Watch the plants closely for signs of wilting to determine if more water is needed.

References:
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[2] http://ag.umass.edu/fact-sheets/helping-trees-to-manage-stress