Colorado Master Gardener[sm] Program
Colorado Gardener Certificate Training
Colorado State University Extension

GardenNotes #266

How to Conduct a Landscape Irrigation Checkup

Outline:

Use with the "Irrigation Check" form for an irrigation checkup.

In the semiarid West, gardeners, landscape managers and communities cannot count on natural precipitation to deliver moisture at the right times or in amounts sufficient to grow most introduced landscape plants. Supplemental irrigation is necessary to grow plants to their potential. Using this water efficiently is in the interest of all because limited precipitation and periodic droughts limit available water supplies. Studies show landscape water savings of 40 percent and often higher are readily obtainable through irrigation checkups and follow-up corrections.

Check Controller Settings

Check controller settings to be sure you are taking advantage of two of the easiest water saving practices that also help you grow healthier plants. They are "cycle and soak" irrigation and "seasonal setbacks." They work for everybody including "hose draggers" who manually set sprinklers.

Cycle and soak irrigation is controlled by how long and how often you irrigate on your watering day. Check and record on the Irrigation check form the start times that are set on the controller and the minutes of run time. Multiple start times with short run times are better because water applied too quickly runs off landscapes. Spray irrigation heads typically apply 1.5 inches of water per hour but clay soils absorb only 0.25 inches per hour. Irrigating for longer than 10 minutes produces water runoff.

The easiest way to avoid this water waste is to irrigate for no more than 8 to 10 minutes (cycle), wait for a minimum of 30 minutes for the water to soak into the soil (soak), and then apply the remainder of the water if needed. Modern digital controllers with multiple start times make cycle and soak irrigation easy. Set your run times for 10 minutes or less. If more water than this is required in hot weather, set a second start time. All zones in the landscape are watered during the first start time and the system turns off. The second start time activates the system and applies the remaining amount of water to the zones.

Irrigation cycling is particularly useful on slopes and clay soils with heavily thatched turf where water runoff is very likely. While landscapes on sandy soil take in water more quickly (0.8 inches per hour), they too can benefit from cycling in situations where runoff is observed. Slower water application to sands also avoids excessive deep soil drainage before water has thoroughly soaked the top soil layer to be held for plant use.

Recording run times and the percentage adjustment settings are important to take advantage of a second water saving practice, **seasonal setbacks.** Plants use about 40 percent less water in cool spring and fall months than in the heat of summer. The amount of irrigation applied should be adjusted accordingly.

If the number of minutes programmed in a controller is set for peak July use, the percentage adjustment can be gradually changed to 60 percent by fall. This one adjustment will change the times for all irrigation zones. Allow the percentage to remain at 60 percent for spring irrigation startup, then gradually increase to 100 percent by the time summer temperatures reach their peak in July. New ET controllers use weather-based technology to adjust seasonal water applications automatically.

Changing the minutes (amount) through the year avoids the water waste that results if controllers remain set to deliver peak amounts all season. As shown in the example in Table 1, water use at a constant, peak setting can add up to nearly 30 percent more than plant water needs over a 24 week irrigation season.

The “Current Program” section of the Irrigation Check form allows you to record the number of **start times, percentage adjustment, watering times** and other settings to gain a complete picture of how water is currently being applied. Record the number of minutes of water applied (**run times**) and the **head type** (spray, rotor, drip or hose) used to water each zone (**station**). Also note in the section above whether there is **efficient technology** installed such as rain sensors, Et controllers or soil moisture sensors. Check for an operating **backflow prevention** device and note.

Table 1. Contrast of water use employing "seasonal setbacks" on an irrigation controller versus a single peak use controller setting for the Denver Metro area.				
	Inches per week (ET)[2]	% of peak July use	Inches used per month[1] using seasonal setbacks	Inches used per month[1] at single peak July setting
April[1]	0.8	53	1.6	3.0
May	1.1	73	4.4	6.0
June	1.4	93	5.6	6.0
July	1.5	100	6.0	6.0
Aug	1.3	86	5.2	6.0
Sept	1.0	67	4.0	6.0
Oct[1]	0.6	40	1.2	3.0
TOTAL inches for season			28.0	36.0

[1] April and October irrigation counted for 2 weeks for a 24 week total irrigation season.
[2] ET or evapotranspiration is the combination of water lost from soil by evaporation and through transpiration by plants in their metabolic processes.

Site Inspection

Record **plant type and quality**. Cool season turf will require more water than low water use perennials. Cool season turf will require irrigation for more months of the year than warm season turf such as Buffalograss that grows from mid-May to mid-September on Colorado's Front Range. Plants watered with a single zone should have the same water requirements. Turf should be watered with a separate zone than flowers and other plants. Plants on a single zone should have the same water requirements. Assess plant quality for signs that plants are receiving too much, too little or the right amount of water.

Note **slope and exposure**. Slopes and exposure affect the amount of water to be applied. Watch for water runoff from slopes when sprinklers are operated to observe problems in the next section. Shady exposures without a lot of tree root competition may use perhaps half the water of a sunny, level lawn. A southwest facing, sunny slope may use twice the water of a sunny, level lawn.

Next use a garden trowel or similar probe to check **soil compaction and lawn thatch buildup**. Water poorly penetrates compacted soils and lawns with thatch layers of more than 3/4 inch. Thatch is a layer of poorly broken down grass stems and roots that looks like brown felt between the soil and green grass blades. Regular core aeration of lawns cuts out thatch and brings soil with microorganisms to the surface to increase the rate of thatch decomposition. Aeration creates a better environment for lawn root growth in compacted soils.

Write down the **average root depth** of the lawn in inches at the top of the form.

Lawns with deeper roots are healthier and irrigation management is easier because more water is stored in the greater volume of soil explored by the roots.

Record the **soil type**. Clay soils can be expected to have poor water penetration but will store a relatively large amount of water allowing longer periods between irrigations. Sands take in water relatively quickly but store less water. They require smaller amounts of irrigation applied but more frequent irrigation than clay soils. Loam soils fall somewhere between clay and sand for water penetration and storage.

Observed Problems

Next remove valve box cover(s) and operate the irrigation system, each zone in turn. Note **broken or leaky valves** in the valve box, **broken or missing irrigation heads and nozzles, and broken pipe** evidenced by water bubbling out of the ground in the landscape. Most water waste will be obvious.

Look at the irrigation heads. Are there **mixed heads** such as spray heads and rotors installed on the same zone? Mixed heads are problematic because spray heads release approximately three times the water of rotor heads in the same amount of time. The result of mixed heads is over-watering or under-watering portions of the landscape. Note **tilted heads**. Heads should be vertically oriented because tilted heads throw more water to one side and less to the other and can result in dry spots due to poor coverage. Record **sunken heads** that have been overgrown by grass diverting spray to a small area next to the head. They can leave areas further from the head lacking for water. Are spray patterns **misdirected** to cover pavement or sidewalks and not solely the landscape? Water waste results. Write down heads with sprays that are **obstructed** by plant growth or other objects creating a water shadow and dry spot. Sprays may cover part of the landscape but **overspray** onto pavement, fences or buildings. Overspray is problematic because it degrades structures and pavement in addition to wasting water. Note overspray.

Note the **arc** of the spray from the irrigation heads. High arc nozzles may throw water high in the air where wind can blow it off target. Low angle nozzles that direct sprays lower to the ground are better for keeping water on-target. Also note the **radius** of sprays and make sure the water from one head reaches or overlaps the next head (head-to-head coverage). If coverage is poor, dry spots will develop particularly during hot weather. Are nozzles partially plugged as evidenced by warped spray patterns? Fully **plugged nozzles** will release no water while warped spray patterns are indicative of partially plugged or worn nozzles. Warped patterns may throw large droplets on one side and a fine spray on the other. Setting out several catch cans and looking for non-uniform amounts of water can also detect warped spray patterns.

Is there **misting** from spray heads indicating that water pressure is too high? Large droplets with a short radius of throw indicate low pressure. Pressure regulators can correct high pressure problems and heads are available that work in low pressure ranges. After a zone is shut down, does the lowest elevation head leak water onto the landscape or pavement? Heads are available with built in check valves to eliminate **low head drainage** and retain the water in the system until the next time it operates.

Drip Irrigation Zone Checkup

Drip systems tend to be out of sight and therefore out of mind, until something fails and plants decline. Although emitters may be embedded in mulch, do periodically uncover and check that they are dripping with the system running. If emitters are broken or missing, note on the form and replace. As plants develop, emitters should be moved away from plants to match the outward growth of roots. Tubing may become pinched, broken or disconnected and require attention. Is the filter present and is cleaning needed? Because drip systems are designed to operate under low pressure, make sure the pressure regulator is present and operational.

Corrective Actions

Use the irrigation check record to correct system deficiencies. Potential corrections and the relative ease of implementation are listed below.

E= easy M= moderately involved C= more complicated

- Change settings to implement cycling and seasonal setbacks as needed.- E
- Adjust water applied for exposure - E
- Core aerate lawns as needed - E
- Adjust amount of water applied and frequency for soil type – E
- Unplug or replace nozzles - E
- Replace broken nozzles – E
- Redirect misdirected sprays and deal with obstructions and overspray – E to M
- Replace broken heads - M
- Remove mis-matched heads and convert zone to the same heads - M
- Straighten tilted heads - M
- Raise sunken heads - M
- Install heads with check valves as needed – M
- Correct pressure with regulators or proper heads – M to C
- Fix leaking valves – C
- Replace drip emitters – E
- Move emitters to match root location with growth of shrubs and trees – E
- Connect or replace drip tubing – E
- Clean drip filter and check pressure regulator - E

For moderately involved to more complicated work, you may need to hire an irrigation professional. See the fact sheet on how to be a wise consumer of landscape irrigation services listed below.

Additional Information

CSU Publications

Fact sheets available on-line at www.ext.colostate.edu

#7.239 Operating and maintaining a home irrigation system
#4.702 Drip irrigation for home gardens
#7.202 Lawn care

Drought Tip Sheets available at www.ext.colostate.edu/drought/tipsmenu.html

CMG GardenNotes available on-line at www.cmg.colostate.edu

#261 Soil water holding capacity and irrigation management
#262 Water-wise gardening: Watering efficiently
#263 Irrigation management: Types of sprinklers
#264 Irrigation management: Converting inches to minutes
#265 Irrigation management: Methods to schedule irrigation

Web Resources

- Colorado ET www.coloradoet.org
- Denver Water www.denverwater.org
- Colorado Water Wise Council www.coloradowaterwise.org
- Northern Colorado Water Conservancy District www.ncwcd.org
- Southeastern Colorado Water Conservancy District www.secwcd.com

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