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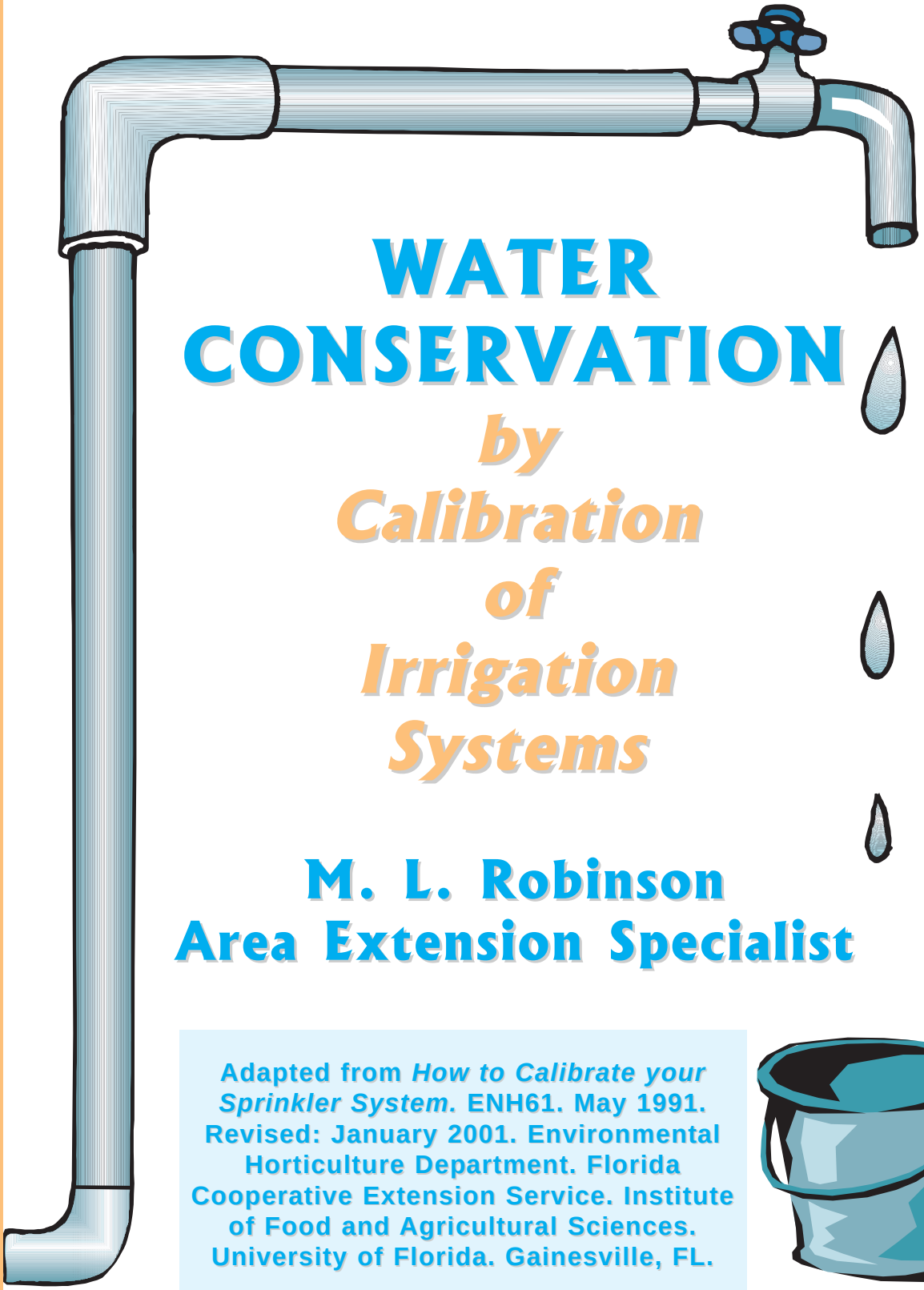

WATER CONSERVATION *by Calibration of Irrigation Systems*

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Adapted from *How to Calibrate your Sprinkler System.* ENH61. May 1991. Revised: January 2001. Environmental Horticulture Department. Florida Cooperative Extension Service. Institute of Food and Agricultural Sciences. University of Florida. Gainesville, FL.

Sixty to eighty percent of southern Nevada's water consumption is used for irrigation of yards and landscapes. Everyone can do his part to help conserve this precious resource. Calibrating irrigation systems is an excellent way to save water with little or no sacrifice. There are many ways to conserve water in the landscape. First, plant more desert and drought tolerant plants adapted to southern Nevada. Second, a more efficient irrigation system that divides the shrubs and trees from turf areas in the watering schedules reduces consumption of water. Third, using spray irrigation for turf areas and drip or low volume systems for shrubs and trees will also save water. Knowing the landscape and being able to tell whether or not it needs water also helps to save. Fourth, the amount of water needed in the middle of winter is going to be different than in June, July, and August, the hottest and driest months of the year. **It is best to think of a time clock as an automated shut off system rather than just setting it and letting it run.** If a landscape needs water, turn the irrigation system on (only on specified watering days). Fifth, in southern Nevada (except for an occasional monsoon rain) irrigating during the summer months is essential for plants to survive. The time of day a person chooses to water is also important. Early morning is best, as it is the coolest time of day, and it is also the time of day when there is little wind.

Once established, many desert-adapted plants can survive with less water than most people think. This can be seen at homes where people have moved out and turned off the irrigation systems. Desert-adapted plants survive, while non-adapted plants die in a few days to a few weeks.

In southern Nevada one cannot rely on the monsoons of the summer or occasional winter rain to carry the landscape plants through, except the very toughest natives. Even they will benefit with some supplemental irrigation.

Familiarity with a yard and its water needs can also save water. One, when lawns are dull, the leaf blades fold together, and footprints are left when walking on the lawn, it is time to water. Two, check on shrubs and trees by probing the soil making sure it is moist several inches under the organic mulch. In the late afternoon of a hot day, if plants wilt or have very dull looking leaves, it is a good indication that they are dry and not getting enough water from the irrigation system. Three, never wait until plants are brown or in permanent wilt (will not come back after watering) to water.

Whether in a severe drought or getting through a dry summer, knowing the amount of water a sprinkler system applies is an essential part of saving water in the landscape. In southern Nevada most people irrigate only by time (minutes) rather than by the amount of water an irrigation system puts out. Although this idea of watering by minutes only has helped people save water in their landscape, more water can be saved by fine tuning the irrigation. Determine the amount of water put out at any given time, and then water less frequently to encourage deep root systems. It is also important to encourage the root system to expand as far from the trunk as possible.

How to calibrate a sprinkling system[1]

1. Take several (5 to 10) coffee cans of the same size, rain gauges or other containers to catch the water. If plastic cups are used, place a small weight (a small stone will do) in the bottom of the cup to prevent it from blowing over.
2. Place the containers throughout the irrigation system zone. Calibrate one zone at a time. An irrigation zone is defined as an area that is watered at each corresponding zone on the clock.
3. Turn the irrigation zone on for 15 minutes.

[1]L. E. Trenhorm, J. Bryan Unruh and J. L. Cisar. *How to Calibrate Your Sprinkler System.* ENH61. May 1998. Revised January 2001. Florida Cooperative Extension Service.

4. Pour all of the collected water from the containers into one, and measure the amount of water collected to the nearest 1/8 inch. Then divide by the number of cans used. If using a large number of containers, measure each container, add up all the measurements, and divide by the number of containers to find the average.

5. To find the irrigation rate in inches per hour, multiply the average depth of water by 4.

This system of calibration allows determination of the amount of water that is being applied when irrigating. If a system waters only 1 inch per hour and it runs only 10 minutes each day, only 1/10 of an inch of water is being put on the landscape. Even daily irrigation of this type will supply only 7/10 of an inch (less than 1 inch) of water weekly. This type of watering creates shallow rooted lawns, shrubs, and trees.

Effective watering requires wetting the soil down 6 inches to 1 foot in one watering. How deep 1 inch of water penetrates the soil depends on the soil type. In a sandy soil, 1 inch of water applied in one irrigation will soak down to as much as 12 inches. In clay soil the depth is more likely to be 4 to 5 inches.

Determine soil type by a simple test. Fill a quart jar half full of soil, and then fill it to the top with water. Shake very well and then let the various soil particles settle out. Sand will be the first to settle, then silt and clay, with organic matter floating at the top. Allow 24 hours to completely settle.

Another way to test how deep irrigation water penetrates is to irrigate for the amount of time the system calibrated for 1 inch of water. Then measure into the soil with a probe or shovel.

In native soils with little or no organic matter, use the screwdriver test. The screwdriver test is to take a 6 to 12 inch (12 inch is better) screw-driver and see how far down it can be pushed into the soil. Native, non-sandy soils are very hard when they are dry, and soft when moist or wet. As deep as the screwdriver goes into the soil will determine the wetting depth. As there are lots of rocks, try several spots to make sure to hit dry soil, not rocks.

How to calibrate drip or low volume irrigation

Drip or low volume irrigation systems are used all over southern Nevada. Most people don't know how much water their drip system is putting out or that it should be run for different lengths of time than turf sprinklers. If the correct amount of water is put out with each irrigation, running the system 1 to 3 times a week should be sufficient for established desert adapted shrubs and trees. These plants also benefit from a good top dressing of compost or other organic mulch. This helps keep the soil cool and slows the loss of moisture from the soil. Design all low volume irrigation systems to expand and grow with the needs of the maturing tree or shrub. The goal is to establish plants as quickly as possible and expand the root system out from the main stem or trunk of the plant or tree. As a survival technique, desert plants have as much as two times their mass underground as above. When the size of the root system is confined to a small area where 2 to 4 emitters are located near the base of the plant, its ability to survive is limited. As a plant grows larger, it is unable to take up enough water in the summer to compensate for loss of water by evapotranspiration of the plant. This is why many non-desert plants die back or even die completely during the hot summer.

A simple test will determine how much water is being applied by each emitter. Use a gallon jar or container for each emitter tested. Place the emitter in the jar and run the system for 15 minutes. It will be easy to tell if the system is a gal/hour or a gal/min system. If the gallon container is over flowing after 15 minutes, the system is a gal/min system, and a larger container will be needed to finish the test. If the container is simply beginning to fill, the system is most likely a gal/hour system, which most systems are. If about a quart of water is collected in 15 minutes then the drippers are one-gallon/hour drippers. If about ½ gallon is collected in the same amount of time, the drippers are two-gallons/hour drippers.

Once the amount of water being applied by the emitters is known, the total amount being applied can be determined with some simple math. 2 gal/hour emitters running for 5 minutes three times a day put out only ½ gallon per emitter. If there are 2 emitters, one gallon of water is applied, 4 emitters put out only 2 gallons of water. This may be enough for a small, newly planted shrub, but not for a mature shrub or tree.

The goal is to water less frequently, but deeper and wider to increase the root system. A larger root system is more efficient in capturing and utilizing soil moisture. Use the screwdriver test to see how deep and wide each plant is irrigated.

Water saving ideas[2]

1. Because water pressures vary at different times of the day, calibrate at the time the system normally runs.

2. Because water pressure can differ in each watering zone, calibrate each zone separately.

3. Never mix sprinkler heads as they put out different amounts of water. Use all the same type of heads in each zone.

4. Use devices such as wind and freeze shut off devices. They automatically shut off the system when there is a high wind that will blow water off the yard area and onto sidewalks, drives, and streets. In northern Nevada, use a rain shut off also.

5. Check the system often (at least once a week) to make sure there are no broken lines or sprinkler heads. These are easily found when wet areas are spotted where they should not be. Check for clogged heads before turf and plants begin to die.

6. Check the drip system at least once a month and more often in summer. Lack of water can kill some plants in a few days. Low volume emitters clog with dirt more often than spray heads.

7. Until plants are mature, add new emitters each year farther from the main stem or trunk to expand the root system.

8. Set a goal to have new plants established within 6 months to a year. Many plants establish more efficiently when planted in the fall because their need for water is not as great as when planted in the summer. Palms are an exception. Plant them from June to August.

9. Gradually wean the landscape off the frequent watering schedule to one that is less frequent, but that waters deeply. Three quarters to one inch of water per application is needed for deep watering.

10. Retrofit old systems to different zones, watering days, and times for turf and shrub/tree areas. Turf needs more frequent watering than trees, shrubs, and ground covers.

11. Cycling of water in each zone will help prevent runoff and facilitate deeper absorption of the water into the soil. A slow steady rain with less water is better than a short heavy one with much more water. If ¾ inch of water is necessary, then it is best to put on ¼ inch 3 times during the watering period, ½ to 1 hour apart.

12. Many homeowners have specialty plants that need extra water, especially newly planted trees and shrubs. Hand water between irrigations until the plants are fully established (6 months to a year). It is not necessary or beneficial to run the entire system and over water everything else.

13. Water only on assigned days.

14. Set a goal to have a landscape that could survive several weeks without irrigation.

15. Always follow water conservation guidelines set by the Southern Nevada Water Authority.

16. Always use pressure compensating emitters.

17. Recycling grass clippings (Don't Bag It Program™) reduces water needs up to 25%.

* The more containers used the more precise calibrations will be. When certified professionals calibrate a system they use 20 to 50 containers or more, depending on the area of the irrigation zone being tested.

[2]Allen Garner, et al. *A Guide to Environmentally Friendly Landscaping: Florida Yards and Neighborhoods Handbook*. SP 191. FCIS. IAS. May 2001. University of Florida. Gainesville, FL.

Please call University of Nevada Cooperative Extension at
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References

Allen Garner, et al. *A Guide to Environmentally Friendly Landscaping: Florida Yards and Neighborhoods Handbook*. SP 191. FCIS. IAS. May 2001. University of Florida. Gainesville, FL.

L. E. Trenhorm, J. Bryan Unruh and J. L. Cisar. *How to Calibrate Your Sprinkler System.* ENH61. May 1998. Revised January 2001. Florida Cooperative Extension Service. Gainesville, FL.

Jeff and Liz Ball. *Smart Yard: The Guide to 60-Minute Lawn Care*. March 1995. Fulcrum Publishers. Golden, CO.

Dr. William Knoop, *The Complete Guide to Texas Lawn Care.* February 1986. Texas Monthly Press. Austin, TX.

Dr. L. V. McCarty. *Calibrating a Sprinkler System*. Florida Cooperative Extension Service. Gainesville, FL.

M. L. Robinson and Wayne Johnson, Ph.D. *The Nevada Landscape Yardstick: Does Your Yard Care Measure Up?*. SP-00-27. December 2000. University of Nevada, Reno. Reno, Nevada.

University of Idaho. *Calibrating Your Sprinkler System*.

Kathleen Rupert and Robert Black. *The Florida Lawn Handbook*. 1998. Institute of Food and Agriculture Science. University of Florida. Gainesville, FL.