Water

...tors that Influence ...Water Need

Proper irrigation replaces both soil water that evaporates from the soil surface (evaporation) and water released into the air through plant pores (transpiration). Evapotranspiration (ET) is the term used for the combined losses. ET depends on the growth stage, size, and type of plant; weather conditions; and available water in the soil.

Lawn and landscape water use begins to rise as plants break dormancy in early spring. As the weather warms and new vegetation develops, water use increases. Use remains high through mid summer and then drops off in August and September (figure 1). Large, daily variations between cool, cloudy days (low water use) and hot, windy days (high water use) can be up to 0.2 inches. As a result, water needed after a week of cool, cloudy weather can be much different from water needed after a week of hot, windy weather. Windbreaks, weed

Windbreaks, weed control, mulches, and compost all tend to conserve water

control, mulches, and compost added to improve soil structure all help to hold water and decrease the need for frequent irrigation.

Irrigation Systems

Decisions about how often and how long to irrigate depend somewhat on the nature of your water delivery and your type of irrigation system. For example, if you get water delivery only once per week, then your irrigation method must be able to apply all the water needed to refill the soil profile during the time when water is available. This may mean flood irrigating lawn and garden areas. A homeowner with well or municipal water may choose to irrigate on a more optimal schedule, possibly two or three times per week.

Flood Irrigation

Flood irrigation of leveled lawns or furrowed gardens may be required if you need to spread water quickly over the property in a deep but infrequent irrigation mode, such as when water is available just one day a week. This method requires little equipment, but gives a less uniform irrigation and less efficient use of water than do sprinkler systems. About the only decision you need to make is how long to allow water to flow onto each area. Because of the complexity of surface irrigation, experience is the best guide to avoid over- or underwatering.

Hose-Move System

In many lawns, irrigation water is applied by single sprinklers attached to moveable hoses. This is an inexpensive but labor-intensive system, and the labor requirements usually result in deep, infrequent watering. You can use this system quite successfully if you match the frequency and depth of watering to soil water-holding capacity and plant water use.

Single sprinklers apply water in a pattern much like that in figure 2. For uniform applications, you should locate the sprinkler so that the edge of a wetted circle overlaps the last (or next) wetted area (figure 2).

Because the irrigation pattern depends on proper water pressure, adequate hose size is important. A $^{5}/_{8}$-inch diameter hose will usually supply one sprinkler if the hose is no longer than 150 feet. To serve two or three sprinklers, or for longer distances, a $^{3}/_{4}$-inch hose is required for adequate water supply and pressure.

Automatic Sprinkler Systems

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	Lawn and garden		Trees and shrubs	
	Usable water remaining (inches/foot)	Days to irrigate at mid-season[1]	Usable water remaining (inches/foot)	Days to irrigate at mid-season[1]
Loam, silt loam, clay loam soil texture				
BT: Forms a ball readily, holds its shape. No moist feeling is left on hand nor will any soil fragments cling to palm. Ball is very brittle and breaks readily. Soil falls or crumbles into small granules when broken. RT: Will not ribbon–soil too crumbly. OPT: Sample very crumbly; readily dissolves into individual particles.				
BT: Forms firm ball. Finger marks imprint on ball. Hand feels damp, but not moist. Soil doesn't stick to hand. Ball is pliable. When broken, ball shatters or falls into medium-size fragments. RT: Ribbons out 1/4-inch or just barely ribbons. OPT: Soil breaks down into granules and is a little crumbly. Continues to crumble until a tiny round ball is left in palm.				
BT: Damp and heavy; slightly sticky when squeezed. Forms tight plastic ball. Shatters with a burst into large particles when broken. Hand is moist. RT: Ribbons out 1/2-inch. Moist soil particles left on thumb. OPT: Sample can be molded into a round ball; somewhat plastic; will not shatter readily.				
BT: W				

If you form a tight ball and can work it into a long, pencil-like shape, about 1.1 inches of water are left for use by your lawn.

Use the information on inches of usable water remaining in conjunction with the water use curve (figure 1) to forecast the days until you need to water and how much to water. This can be done anytime during the growing season.

For example, suppose it's early season in southern Idaho.

Step 1. Run a feel and appearance test to find out how much usable water is in your soil:

The results of the feel and appearance method on a soil sample from your lawn, taken 4 inches deep, are the following: "BT: Wet, sticky, doughy, and slick. A very plastic ball forms. The soil handles like stiff bread dough or modeling clay and isn't muddy. The soil leaves water on your hand, and the ball changes shape and cracks appear before the ball breaks. RT: Ribbons readily. OPT: Forms a tight ball. Will work into a long, round pencil-like shape." From table 2, you would see that 1.1 inches of usable water remain in the soil.

Step 2. Use figure 1 to find out how much water your lawn uses at this time of year:

From figure 1, you can assume that water use will be about 0.1 inch/day.

Step 3. Calculate days until the next irrigation (inches usable water remaining ÷ inches of water use per day):

Given your results in steps 1 and 2, days until the next irrigation would then be

1.1 inches ÷ 0.1 inches/day = 11 days

Step 4. Use information from table 1 to determine how much water to add back to the soil:

If the soil is silt loam, 1.1 inches of water should be applied to fill the soil to capacity.

Step 5. Correct for various water losses that occur during watering:

Since only a portion of the water pumped (about 80% for sprinklers) ends up in the plant root zone for use by the plant, you will need to apply more than 1.1 inches. Actual irrigation depth required to re-fill the root zone is then

1.1 inches ÷ 0.8 = 1.4 inches.

Water added in excess of 1.4 inches is wasted and has the potential to move soluble herbicides and pesticides below the root zone.

Table 2 also gives days until irrigation is needed at mid-season (four days in the above example). These numbers are based on averages from 11 years of weather data in southern Idaho.

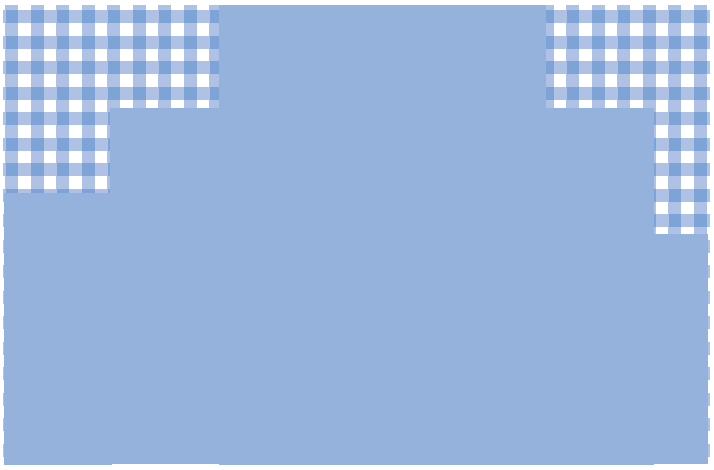
ET for northern Idaho conditions is about 85 percent of southern Idaho values during mid-season. Therefore, the number of days until the next irrigation should be increased 1.18 times for northern Idaho. These numbers are based on average conditions. By checking the soil before every scheduled irrigation, any tendency to over or under-irrigate can be spotted and the water application rate modified.

General Watering Guidelines

Apply enough water during each irrigation to replenish the water used by the plants between irrigations. The best practice is to thoroughly soak the soil, then irrigate again only when necessary. For most lawn or garden conditions, this means you should never add more than 1.1 inches of water to silt loam soils or 3/4 inch to sandy soils in a single irrigation. Shrubs and trees can accommodate about twice as much. Because trees and grass both use water, a grassy

improperly sized, or pressure too low or high, uniform distribution of water will be impossible. The result will be areas of over- and underwatering.

Sprinkler systems are designed for peak, mid-season use and must be adjusted for off-peak spring or fall operation. A reasonable practice is to change sprinkler settings monthly or, at the least, three times during the growing season (figure 4). Most modern irrigation system controllers use a "percent timer" setting to make changes in water added per irrigation easier. The percent setting is the fraction of the maximum system applica-



inches under trees and 12 to 24 inches under shrubs. The most critical factor in tensiometer installation is to ensure good contact between the ceramic cup at the bottom of the tensiometer and the soil. If you follow the manufacturer's installation and maintenance suggestions carefully, this device will work well for many years. Because these devices contain water, they need to be removed in the fall and stored in a nonfreezing area.

Tensiometers should always be read about the same time of day. When the instrument gauge shows a moderately dry reading (30 on sands to 70 on silt loam soils), apply water based on the guidelines discussed above to rewet the soil. Recheck the gauge 12 to 24 hours after irrigating. If the reading is 5 to 15, your irrigation was correct. If the reading is 0 to 5, use a shorter application next time. If the reading is more than 15, your next irrigation should be longer.

If irrigating flowers, gardens, or trees with a hose, bubblers, or trickle system, apply enough water to soak down to full root depth. One or 2 inches will probably suffice for flowers and vegetables, but 4 or 5 inches are needed in a tree basin. If the basin is shallow, fill it with water, and keep it full for one to two hours without overflowing.

Newly transplanted trees may need more frequent irrigation until they become well established. At the time of tree planting, water sufficiently to ensure that air pockets in the soil around the root ball are filled with water. This helps the soil to settle, providing better support against the wind, and provides better soil/root contact. Because the root ball usually contains only about 10 percent of the roots originally formed by the tree, it must be kept moist during the first growing season to avoid water stress. In subsequent growing seasons, the root system will have developed so trees can be watered deeper and less frequently. When possible, transplant trees in early spring or fall. The cooler weather produces less demand for water, and root growth occurs before the next high-water-demand season.

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