



Colorado MASTER GARDENER

Irrigation Management: Types of Sprinklers

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Different types of sprinklers are most effective to water different planting areas. For grass, pop-up and rotor sprinkler heads are generally used. Other types include drip emitters and micro-spray heads for shrub areas, flowerbeds and vegetable gardens. Because each type of sprinkler delivers water at a different rate, don't mix sprinkler types in a zone.

Pop-up Heads

This type of head is used for general watering, like the lawn area, and is a generic name for sprinklers that automatically pop up and don't rotate when running. In plastic pop-up heads, retraction is caused by a spring.

Delivery pattern – Pop-ups are best suited for moderate size home lawn areas (larger than 7 to 10 feet wide up to 30 to 45 feet wide) and irregular or curvilinear areas.

Pop-up spray nozzles are most common in 10, 12 and 15 feet radius and in quarter-circle, half-circle and full circle. A pop-up spray nozzle can usually be adjusted down about 30 percent, using the nozzle's adjustment screw. So a commonly available 10-foot nozzle can be reasonably adjusted down to 7 feet. Any greater adjustment would significantly distort the pattern, resulting in poor application efficiency

The spray pattern of a pop-up head depends on choosing nozzles to water quarter-circles (90 degrees), half-circles (180 degrees), or full circles (360 degrees). A few manufacturers offer a variable arch nozzle. However, don't use adjustable nozzles where a fixed nozzle would work, as the pattern predictability of the adjustable nozzles is not as good as that of fixed nozzles.

Some specialty patterns to handle narrow rectangular turf areas are available, (often called end-strip, center-strip, or side-strip nozzles). However, nozzle performance is not as predictable or as uniform compared to quarter-circle, half-circle or full-circle nozzles.

Pop-up height – For uniform distribution, the sprinkler heads should rise above the grass height, making the 4 inch pop-up style most popular.

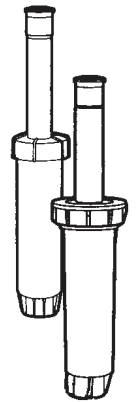


Figure 1. Pop-up spray nozzle.



Figure 2. Make sure sprinkler heads rise above the grass height for uniform water distribution.

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Putting Knowledge to Work

High pop-up head, with a 12-inch rise, are suitable for ground cover area and lower flower and shrubs beds.

Pressure – Pop-ups work best with water pressure at 30 to 40 psi. The water pressure at some homes can be significantly higher and an inline pressure regulator will be needed. A sprinkler producing a mist cloud around the head is a common symptom of excessive pressure. This not only wastes water but also can give a distorted distribution pattern and lead to increased maintenance problems. Some heads come with built-in pressure regulators that ensure sprinkler heads distribute water at the manufacturer’s recommended rate. Also, a grade change of more than 8 vertical feet on a single zone will result in significantly higher pressure at the lower end, creating distribution problems.

Small Areas – Small areas less than 7 to 10 feet wide are difficult to sprinkle irrigate efficiently with pop-up heads. Consider landscape alternatives. For example, that small side yard between houses may be an excellent site for a low maintenance, non-planted, non-irrigated rock mulch. Or the small area could be a shrub or flowerbed watered with drip emitters, micro-sprays or bubblers. A narrow lawn strip may be watered efficiently with the new subsurface drip for lawns.

Precipitation rate – Pop-ups have a high water delivery rate (**precipitation rate**) at 1 to 2½ inches per hour. At the typical rate of 1½ inches per hour, the pop-up head would apply ¼ inch of water in just 10 minutes.

Rotor Heads

Rotor heads mechanically rotate to distribute the spray of water. The impact type and gear driven type are two common types in the home garden trade.

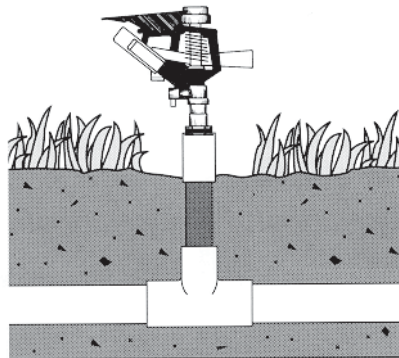


Figure 3. **Impact or impulse heads** rotate as the water stream coming from the nozzle hits a spring-loaded arm. Impact heads tend to experience fewer problems under marginal (dirty) water quality.

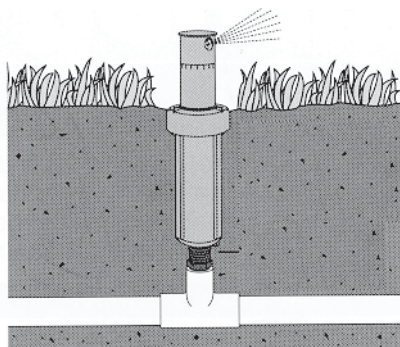


Figure 4. **Gear-drive heads** use the flowing water to turn a series of gears that rotate the head. Compared to the impact heads, gear-drive heads are quiet to operate.

Rotor heads are best suited for larger lawn areas, greater than 30 feet wide. The rotor-type head has a typical radius of 30 feet up to 90 feet in some commercial-line heads.

The spray pattern depends on the head. Many can be set at any angle from 15 degrees up to a full circle. Some are adjusted at 15 degree increments. Others are designed for quarter-circle, half-circle or full-circle.

Rotor heads typically operate at 40 to 90 psi; 40 to 50 psi being most common for heads in the home garden.

Rotors are more uniform in water distribution than pop-up heads, and take much longer to water. As a rule of thumb, rotor heads deliver water at a rate of $\frac{1}{4}$ to $\frac{3}{4}$ inch per hour. At the typical precipitation rate of $\frac{1}{2}$ inch per hour, it would take 30 minutes to apply $\frac{1}{4}$ -inch of water. The slower precipitation rate can be an advantage on clayey or compacted soils where water can be slower to infiltrate.

Bubblers

Small groupings of flowers and other small plants can be efficiently watered with bubblers (which flood an area and rely on the natural wicking action of the soil to evenly spread the water).

They are ideal for shrub and ground cover areas. Heads are typically placed at 3 to 5 feet intervals or placed by individual plants for spot watering. Stream bubblers are directional and come in a variety of spray patterns.

Bubblers deliver water faster than drip emitters and are used to water trees and shrubs.



Figure 5. Bubblers are efficient when watering small groupings of plants or flowers.

Drip Emitters and Micro-Sprayers

For flowerbeds, shrub areas, small fruits and vegetable gardens drip emitters, micro-sprayers, and drip lines are popular.

Since drip emitters and drip lines directly water the soil rather than spray water over the surface, water use rates, weed seed germination, and foliar disease problems are reduced.

Drip emitters, micro-sprayers, and drip lines require clean water which is relatively free of soil particles, algae, and salts and operate at lower pressure than regular sprinkler systems. A filter is a mandatory part of the system.

The system is put together with $\frac{1}{2}$ inch and $\frac{1}{4}$ inch poly tubing, fittings, and heads. For the main line and branch lines, $\frac{1}{2}$ inch poly tubing is used. The $\frac{1}{4}$ inch micro-tubing serves as feeder line to individual drippers or microsprinklers. The tubing may be on the surface, under the mulch (generally preferred), or buried.

Drip emitters deliver water at a slow, consistent rate, such as 0.5 to 2 gallons per hour. Emitters connect to micro-tubing and are a good choice for watering individual plants or pots.

Micro-sprayers, often held up on a spike, cover a radius of 2 to 13 feet. Delivery rates vary from 0.1 to 10 inches per hour depending on the type of head selected.

Specification on design and management vary greatly between manufacturers and types selected. Run times vary from 10 minutes to several hours depending on heads used and situation. Refer to the manufacturer's literature for details.

Drip emitters and micro-sprayers typically operate at 20 to 50 psi. Some systems require inline pressure regulators while others have pressure compensating emitters.

Like any irrigation system, drip and micro-sprayer systems require routine maintenance.

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