As long as humans have cultivated crops, irrigation has been used to grow bigger, healthier, and more productive plants. This highlight briefly reviews three of the most common irrigation systems in Oklahoma, discusses their history and advancements, and gives you the resources to maximize the return on your investment.

Surface Irrigation Systems
Surface irrigation is the oldest known irrigation type, developed in the Middle East about 7,000-8,000 years ago. This simple system, also known as gravity irrigation or flood irrigation, relies on gravity to distribute water applied at the soil surface across a field. Compared to other irrigation systems, surface irrigation requires a much smaller economic investment upfront and usually lower maintenance costs.

Surface irrigation requires a large amount of water applied over a long period of time to ensure water makes it to the farthest reaches of the field and has enough time to percolate to the roots. As a result, application efficiency is around 60%, meaning approximately 40% of applied water is lost. However, this efficiency can be improved by ensuring the ground slope and soil texture are appropriate for surface irrigation, water supply and flow rate are sufficient without being erosive, and by adopting the latest water management technologies. For more information, please see Extension fact sheet BAE-1527: Surface Irrigation Systems and watch this “Oklahoma Mesonet” video for tips on using weather data to irrigate more effectively.

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Sprinkler Irrigation Systems
More than three-quarters of Oklahoma’s irrigated agricultural lands use sprinkler irrigation systems. These systems deliver and apply water to the field through pipes and sprinklers. There are several methods of sprinkler irrigation, but the most common is center pivot systems that pump water from a central point and spray it through drip hoses and nozzles.

Early center pivot systems featured sprinklers on the mainline that sprayed water 50-100 feet through the air, causing much of the water to be lost to evaporation and wind drift. These high-pressure systems require more energy to operate than the low-pressure systems commonly used today. Modern center pivot systems feature hoses that hang from the mainline, and are classified by the elevation of their nozzles. Center pivot systems with nozzles closest to the ground tend to be more efficient because less water is lost to wind and evaporation. For more information, check out the “Sprinkler Irrigation” video on our YouTube channel.

Drip Irrigation Systems
Also known as localized, trickle, or micro-irrigation systems, drip irrigation systems apply water directly to the root zone, rather than the entire surface of the field. The most popular type in our state is subsurface drip irrigation, which relies on drip lines buried 12-18 inches below the soil surface. Tiny emitters release small amounts of water on a daily basis, minimizing evaporation and other water losses. A well designed and maintained subsurface drip system can be more than 95% efficient! This efficiency is especially important when water supplies are limited, since drip irrigation systems can stretch the supply to cover up to 25% more acreage than sprinkler irrigation. Because it reduces humidity and keeps foliage dry, drip irrigation also reduces the incidence of fungal disease in the crop, and its automated system reduces labor requirements.

Producers can expect a properly designed and installed drip irrigation system to be more expensive upfront than other systems; however, the savings from lower operating costs and higher efficiency will more than justify the investment in the long term.

To learn more about any of these irrigation methods and to find the right system for your situation, please visit http://water.okstate.edu, read the fact sheets linked below, and contact your county Extension office.

Additional Resources
- “Efficient Irrigation Methods” fact sheet collection
- “Foundations of Oklahoma Water” video series
- BAE-1501: Water Measurement Units and Conversion Factors
- BAE-1502: Irrigation Water Flow Measurement
- BAE-1511: Drip Irrigation Systems
- BAE-1527: Surface Irrigation Systems
- BAE-1530: Irrigated Agriculture in Oklahoma
- PSS-2401: Classification of Irrigation Water Quality