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Engineers: Smart irrigation controllers not so smart

All units as tested would put on excessive water

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COLLEGE STATION – Tests of "smart" irrigation controllers found most of the devices currently on the market were not as smart as hoped, said Texas AgriLife Extension Service irrigation experts.

The six devices tested, all currently on the market, applied from about one-third to two-and-a-half times more water than was recommended, according to Charles Swanson, AgriLife Extension associate with the Texas A&M University department of biological and agricultural engineering.

"These devices have the potential to save water, but our data shows they're just not there yet," Swanson said.

Smart controllers use weather data to automatically adjust the amount of irrigation water applied. Some smart controllers use sensors at the irrigation sites to measure temperature and rainfall. They may also measure solar radiation, wind speed and relative humidity.

Other controllers, commonly called ET Controllers, use evapotranspiration data acquired either through the Internet, telephone or pager to estimate landscape water requirements, he said. Both ET and on-site sensor controllers use the data they receive to estimate evapotranspiration at the site and apply enough water to offset it.

Swanson and Dr. Guy Fipps, an AgriLife Extension engineer and director of the Irrigation Technology Center, tested both types of controllers over an eight-week period from early August

through late September. ET controller bench tests were conducted in an indoor laboratory while an outdoor lab test was used for the controllers with on-site sensors.

Why the gross inaccuracy?

Part of the answer is that there are several methods to calculate evapotranspiration. Swanson and Fipps used the Standardized Penmen-Monteith method, a model generally recognized as the gold standard. This method takes into account many factors, including solar radiation, Swanson said. Generally, methods that factor in solar radiation will be more accurate.

"From what I've been able to gather, some companies are tying into the (local) airport or weather stations that are posted online, because every city has an airport," Swanson said. "ET data calculated with such weather data tends to be inaccurate."

Swanson noted that the units with on-site sensors did better in the tests than the ET controllers. The on-site sensor controllers applied on average about 70 percent less water than the ET controllers, and saved water compared to most manual applications.

Typically, manually controlled irrigation units on timers apply about twice as much water as needed, he said.

There are several possible causes for the over-irrigation, including improper ET values, high plant coefficients and insufficient accounting for rainfall.

The study is important because of the potential water savings by using smart irrigation controllers, Swanson said. Several Texas cities are currently considering making smart controllers mandatory with the installation of new irrigation systems. For example, the city of Frisco now mandates smart controllers.

"If these controllers are to become requirements across the state, then it is important that they be evaluated formally under Texas conditions," Swanson said.

Swanson and Fipps noted in their formal report that although the smart irrigation controllers did over-water, they were potentially superior to manually controlled systems.

A copy of the report can be viewed on the Irrigation Technology Centers Web site at http://ITC.tamu.edu.

"The technology shows good promise but it definitely needs upgrading," Swanson said, adding that manufacturers are constantly updating their products.

"Two (manufacturers) have contacted us on what they can do to make their controller better," he said. "The others -- we're still waiting on a response."

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